

JAN.
1936

ELECTRICAL CONTRACTING

ENGINEERING • INSTALLATION • REPAIRING • MARKETING

1936 JANUARY 1936
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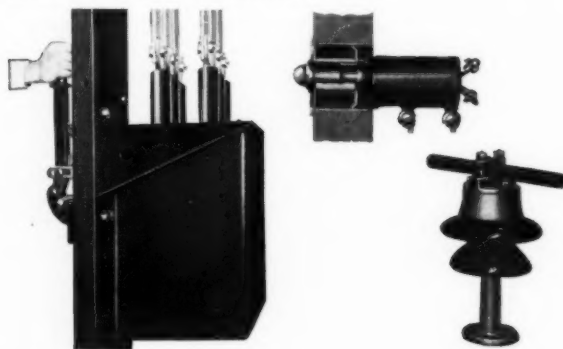
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GENERAL ELECTRIC

Electrical Contracting, January 1936

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ELECTRICAL CONTRACTING

With which is consolidated

The Electragist and Electrical Record

Established 1901

Official Publication
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Contractors Association

INSTALLATION

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MAINTENANCE

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for

**ELECTRICAL
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ENGINEERS

SERVICE SHOPS

**and others engaged
in the business of
electrical construction**

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Vol. 35

JANUARY - 1936

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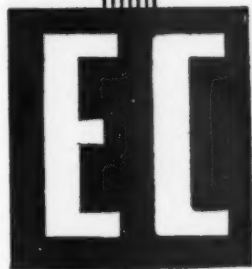
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JANUARY

1936

Program

THE basic program of business paper publishing is one of promoting the best interests and helping to improve the business of the field served through suggestions, reports and analyses. To do this work constructively, a publication must engage in constant wide-spread field contact, must study the problems of its industry, and search for remedies, must through suggestion be able to stimulate thinking and action within the industry.

IN ITS program for 1936 ELECTRICAL CONTRACTING has plans to greatly improve its service to its readers in these basic principles. While the staff last year traveled many thousands of miles contacting subscribers at their place of business in approximately one hundred cities located in nineteen states, it is planned this year to greatly extend our field contact geographically. In so doing it is expected that it will be possible to bring to the attention of our readers a much more diversified presentation of field practice.

THROUGH this wider field contact we hope also to be able to make analyses of economic conditions within our industry in the belief that these studies may indicate means whereby waste may be lessened, service improved, and the business generally strengthened.

NOT only will ELECTRICAL CONTRACTING continue to bring to its readers its regular features of current practice in installation in both new work and modernization, repair shop methods and economies, field analyses of new developments, interpretations of the National Electrical Code, general and association news, but it will extend its service to include successful selling methods by members of the industry and product studies to enable its readers to make a better selection of products for the use to which they are to be put.

WITH this larger editorial treatment, ELECTRICAL CONTRACTING expects to be able to offer its readers a well rounded program that will be adapted to meet the industry's current needs.

ITS ability to so act as a medium of interchange of information and suggestion has been possible only through the splendid cooperation which its staff has received from its readers. This continued cooperation will enable us to do an even better job for the industry in 1936.

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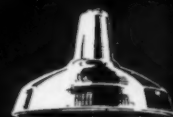
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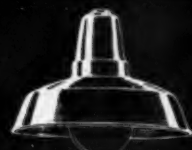
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 For Gardens, Industrial Yards,
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 Floodlighting

ELECTRICAL CONTRACTING

Vol. 35 JANUARY, 1936 No. 3

▲
S. B. Williams, Editor
▼

FIELD BRIEFS

● IN ORDER TO PROVIDE for the growing appliance load, Richmond, Cal., is now requiring a 3-wire service for all jobs having more than two branch circuits. For three and four branch circuits, three No. 10 service feeders are required, five to eight circuits, three No. 8s, ten to twelve circuits three No. 6s. Because the heavy load is generally in the kitchen, Inspector McLaughlin is recommending a balanced 2-circuit 3-wire system for this area.

● LAST YEAR SET A PEAK in incandescent lamp sales—707,000,000. The preliminary estimate includes 410 million large lamps and 297 million miniatures.

● WESTCHESTER County, N. Y., employers have a working agreement with their county-wide local union that tends to keep everyone in his own community. The men must be paid all daily bus fare in excess of ten cents for going to jobs in towns other than where the

employer's office is located. This sometimes amounts to sixty cents per day or more per man. They must report at the employer's office sufficiently early to be transported to a job by eight o'clock by the contractor, if he elects to transport them. Men are only permitted to drive their own autos for going to large isolated jobs that have no bus or trolley lines nearby.

● WIRING SAFETY notices were fastened to this year's tax bills in Seattle, by the fire department. The notice read, "Be safe from fire. Check your electrical wiring for defects, loose connections, defective appliances and bridged fuses. Remember that fuses are the safety valve of a lighting system. Do not bridge them with pennies or otherwise when blown. Replace fuses with new ones. Don't take a chance."

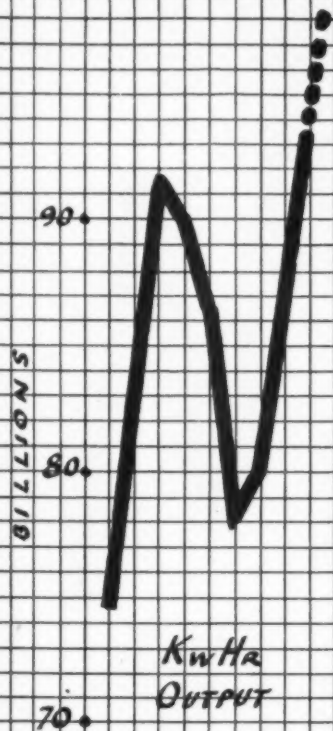
● SOME STRANGE SITUATIONS arise in the contracting business at times. A Trenton, N. J., contractor viewing the en-

trance of hardware stores into the electrical range business, has set up a counter competition in gas ranges. In Hoboken, N. J., where the population has decreased greatly in the past few years, contractors are selling fuel oil.

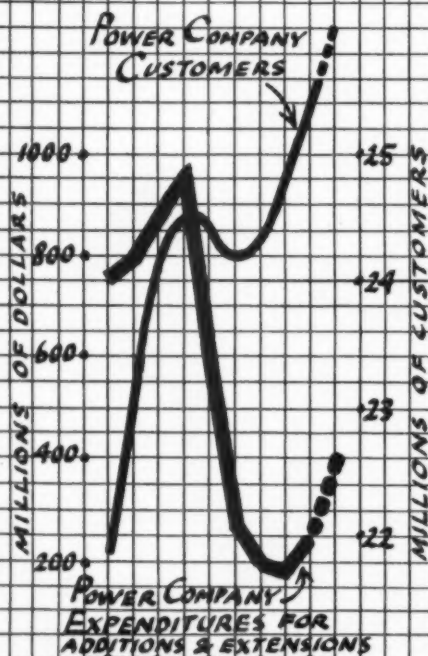
● ELECTRICAL MANUFACTURING business, according to a statement by Gerard Swope, president, General Electric, increased 30 per cent last year which was about the same increase as in the previous year. Continued improvement is expected in 1936.

● THE RESULTS of a recent experimental outdoor mercury vapor lighting installation in a Belleville, N. J., gas station opens a promising re-lighting field for electrical contractors. Readings of .5 f.c. before, and 5 f.c. after these units were installed, are reported. A new station is now being completed, that has eight permanent units which provide an average intensity of 5 f.c., while using 3,000 watts less in lamp load.

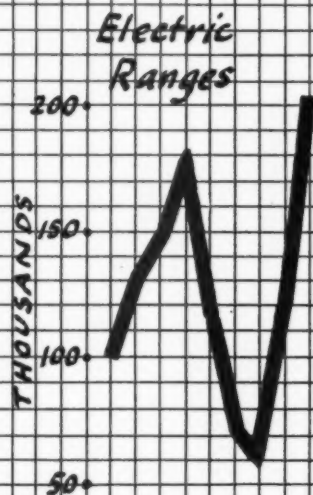
Trends



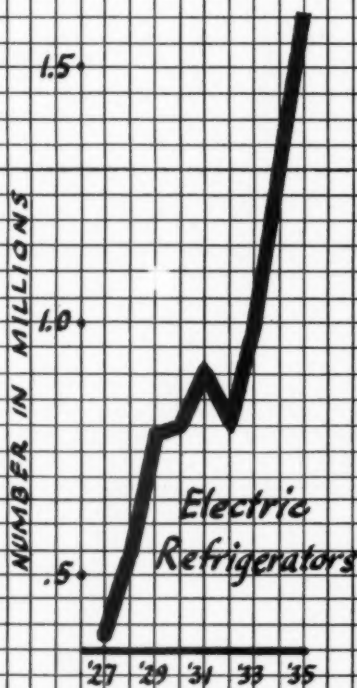
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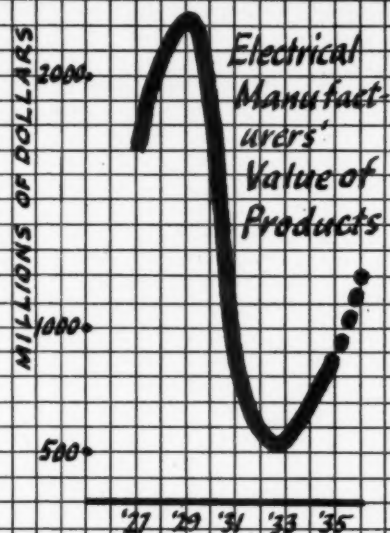
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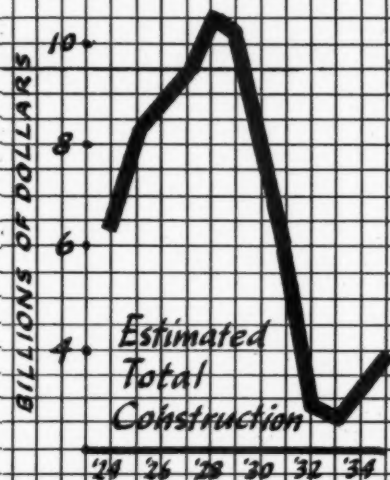
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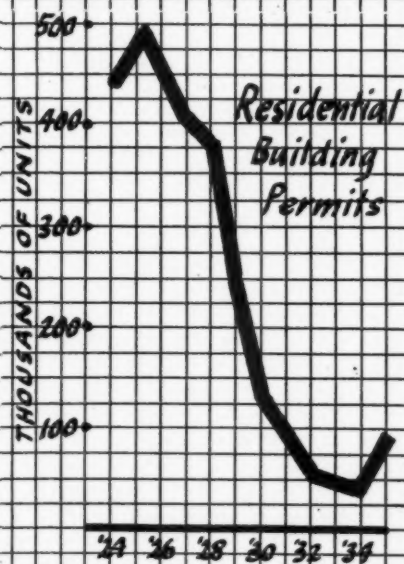
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Data: Electrical Merchandising



'27 '29 '31 '33 '35
Data: U. S. Census and Electrical World



'24 '26 '28 '30 '32 '34
Data: Eng. News Record - Federal Reserve Loan Bank Board - U.S. Dept. of Labor Statistics



'24 '26 '28 '30 '32 '34
Data: U.S. Department of Labor

A Call for Industry Good Will and Planning

by Earl N. Peak

President, National Electrical Contractors Association

As is customary at this time each year, Mr. Peak, as President of N.E.C.A., was invited by Electrical Contracting to prepare a New Year's message, not only to the members of the Association, but to the electrical contracting industry generally. This statement, presented by Mr. Peak before an electrical industry conference in New York on December 12, at which the N.E.C.A. was host to executives from the national associations of manufacturers, utilities and wholesalers, is published at the request of N.E.C.A., as the most constructive message that its president could convey to the members and to the industry at this time.—EDITORS

THE electrical contractors were pleased to extend the invitation for this meeting but were much more pleased with the spirit with which it was received, and it is needless to say that we are very happy to have you members of the electrical industry with us this evening. We sincerely hope that this will not be the last meeting of this kind, but just the beginning of a movement that will continue indefinitely for the betterment of the electrical industry and its members.

The objects of this meeting are to get better acquainted, to build confidence in each other, to consider plans for a co-operative program and a suggestion for a good will and planning committee. Following this opening presentation we want to have an open forum, in which we ask all to take part and to express themselves freely.

For the past few years conditions have been such that we have not found time to get together as an industry to discuss problems of the industry in which we are all mutually interested. In fact, I have always

felt that we have never really taken the time to consider a constructive program as we should, and I believe we have all paid plenty for not having done so.

True, we have had many meetings but at these meetings I feel that we have not come together for such broad purposes, with the right spirit, or followed through in the proper manner—or something, so that we could give full consideration for our industry welfare.

And who is to blame for this condition and why? We members of the industry are responsible for this condition and to my mind the reason is—lack of confidence in each other has kept us apart, so that we have been unable with our divided forces to do a constructive job, and our competitors, such as the automobile industry, the cosmetic industry, the gyp electrical manufacturer, wholesaler and contractor, have run away with the lion's share of the American's spending dollar.

Therefore, isn't it about time that we, the men of the electrical industry, woke up and got busy in a collective effort to improve our conditions? I believe all will agree that something should be done and at once.

If this is true, what shall we do first?

The first thing to be done is to establish confidence in each other and between the several branches of the industry. To my opinion this has never been done in a national manner and must be if we are to succeed with any program.

True, there are many happenings of the past that do not recall pleasant memories but may we forgive and forget and start anew tonight, with confidence and a determination to put over a bigger and

better program than this industry has ever known.

May I ask of the manufacturers, wholesalers and utilities, do you feel that the officers, the executive committeemen and the special committeemen of the N.E.C.A., whom you have met tonight, are men you can trust? Are they men you can have confidence in to assist in doing the things you want done, and are they the type of men who you feel can develop a program which you will want to support and will be anxious to be a party to? Or at least, are you willing to give us a chance to prove our sincerity? These questions are for the electrical manufacturers, wholesalers and utilities to answer.

Do we as electrical contractors have confidence in you men as manufacturers, wholesalers and operators, and are we willing to have our membership assist in carrying out a constructive industry program? As president of the N.E.C.A. my answer to these questions is "Yes"—and we trust that the answer from other branches of the industry as regards us is likewise "Yes."

But before having your reply may we tell you some of the things we are doing for the betterment of the industry and of our membership.

First, we have undertaken to set forth the functions of the electrical contractor, as the basis upon which the part of the contractor may be measured in its relation to the rest



E. N. PEAK

of the industry, as we see it. We define the functions of the electrical contractor as follows:

1. Creating demand for electrical products by salesmanship, contact with consumers and market development;
2. Building good will for and exploiting the products of particular manufacturers by recommending and using such products when installation contracts do not call for parts by trade names;
3. Making no substitutions for specified products where the manufacturer has created a specific demand;
4. Supplying engineering experience in the proper assembling of the diverse products of different manufacturers and combining them into a balanced installation;
5. Guaranteeing the successful operation of the entire installation, including the parts contributed by each manufacturer; and
6. Supervising and servicing the

successful operation of the equipment after it is installed, thereby assuring continuing good will for the products.

The electrical contractor is entitled to an adequate differential over the consumer as compensation for these services. We are asking for such compensation only for electrical contractors who perform the services shown above. Our task is to demonstrate through effective organization that we are prepared to protect the industry against the demands of any contractor who expects such compensation without performing these services. On the other hand, an economic balance in distribution cannot be attained if either the manufacturer or the wholesaler by-passes the contractor to get the cream of the business and

leaves to the electrical contractor only such sales as require the greatest expense and effort to obtain.

Today our National Executive Committee has approved the form of individual membership pledge which is given on this page and which the N.E.C.A. proposes to submit to our membership for their adoption.

There are many activities and services of the N.E.C.A. now in operation of especial interest and value only to the electrical contractors, such as assistance and guidance in the organization of local and state associations, national survey of wage rates, service bulletins on the Social Security Act, etc.

A few words on possibilities of the future. In the past we have been so busy finding fault with each other and then devising ways and means to show how much we could tear down of the other fellow's program that there was not much time left to do anything else. But if we are agreed on a constructive program and have established mutual confidence and are determined to work together as an industry, there are many vital things for us to do today.

A Rural Electrification Program has great possibilities and to give you somewhat of an idea of what the R.E.A. Program of the government means to the electrical industry I cite the following: Line construction and equipment, trans-arrestors, cut outs, etc., \$100,000,000. This opens up 100,000 miles of construction which will average around 3 customers per mile at least, or 300,000 farm wiring jobs. These on an average will be about \$125 each or \$37,500,000. In addition to this the appliances, motors and equipment per farm will average \$250 or \$75,000,000. Total possibilities of \$212,500,000, and this is but a start when you take the entire United States into consideration. In the State of Iowa alone, if 1,000 miles a year were constructed, it would take at least 40 years to build one-half the prospects of that state. Then think of the balance of the country!

What is going to be done with the gas tax when the paving is paid for? Have we any interest in this? We should have, for what greater safety factor is there than a well lighted highway. Just why should we not be planning on lighting the

(Continued on page 60)

PLEDGE OF COOPERATION

National Electrical Contractors Association

As a qualification for membership in the National Electrical Contractors Association, we pledge active support and cooperation in the following ways for the betterment of the Electrical Industry and the public welfare.

1. We adopt as the standard of our business as electrical contractors the following wiring policy established by the National Electrical Contractors Association:

The National Electrical Contractors Association declares its policy to be the extension of electrical service to the greatest number of users and to this end the Association believes that every effort should be made to reduce the cost of electrical installations through developments in wiring methods and installation practices consistent with the safety and convenience of the public, which must be safeguarded at all times.

2. We will conduct our business along proper and ethical lines, keep an accurate record of all transactions, and sell on a basis that will permit prompt payment for labor, materials and business expenses and meet our responsibilities to the customer and to the community.

3. We will at all times avoid the use of sub-standard materials, methods and workmanship, or any installation that falls short of adequate safety and service to the user of electrical energy according to legal requirements and duly approved standards.

4. We will actively promote to the best of our ability such standards as "Better Light, Better Sight" and all similar promotions designed by the electrical industry to render more adequate and satisfactory service to all users of electricity.

5. We will familiarize ourselves with the electric rates prevailing in our community in order to discuss intelligently with customers the cost of operating electrical appliances, motors, heating and cooking, as well as proper lighting.

6. We will actively promote the sale and use of current consuming devices, realizing that such promotion offers

greater service to the customer, increased business opportunities for wiring, as well as in the sale of such appliances. If not stocking and selling such appliances, we will refer prospects for same to a regularly authorized and established dealer, preferably an active member of the Association.

7. We will not contribute anything, by word, action or otherwise, that will tend to destroy confidence in the electrical industry as a whole; nor will we permit unjustified attacks upon any branch of the electrical industry to go unchallenged without an honest effort to get at the source of complaint or criticism, and will endeavor with the help of the Association to adjust or remove the cause and effect of same, by proper methods of education or arbitration.

8. We subscribe to this pledge for the purpose of enhancing the usefulness of electricity to the public and for the rendering of more adequate and satisfactory service to all users of electricity.

9. It is understood and agreed that if we desire to withdraw from this pledge of cooperation we may do so upon giving notice in writing of our intention to the National Electrical Contractors Association, whereupon our membership shall cease.

10. We agree that if any complaint of violation of this pledge shall be entered against us by any cosigner of the pledge we will meet with the Executive Committee of the Association, or any representative of the Association appointed by the Executive Committee to investigate such complaint, and that if, after final review by the Executive Committee itself, such complaint is found to be true and inimical to the best interests of the public, the Association and the Electrical Industry, we will forfeit our membership in the Association and all benefits attached thereto, if required by the Executive Committee as provided for in the Constitution and By-Laws.

AUTOMATIC CONTROL

Reduces Brewery Operating Costs

THE replacement of steam drives with 2,200-volt motors for the Iroquois Beverage Corporation of Buffalo, N. Y., provides an installation with (1) extremely safe and simple to operate motor equipment, (2) automatic control of the peak demand, (3) automatic operation of an important sequence of valves and by-passes that had formerly been operated manually at remote points, and (4) a first year saving of \$2,700 electrical energy, a 25 per cent increase in refrigeration tonnage, a coal saving of more than \$4,300, and a \$1,400 saving through the application of power rates, made possible because of this re-vamped plant.

In designing this installation, Wipperman & Michell, Inc., local industrial contractors, sought to eliminate human hazards and errors wherever possible, by the use of interlocked remote control equipment. Because safety precautions were held foremost, the starting of these motors was reduced to push-button operations, after which solenoid-operated valves perform their respective functions. All 2,200-volt connections except those terminating at the motors are confined to locked switchboard and service equipment rooms. Automatic peak load limitation was coordinated with the motor and valve control equipment to eliminate human supervisory responsibility to a point where compressor operations are automatically held within predetermined levels of economical energy consumption, in accordance with the power company's rate structure.

This plant uses a direct expansion refrigerating system, for which 150-hp. and 100 hp. 2-speed, constant torque squirrel-cage motors drive 75- and 50-ton compressors respectively. Another 200 hp. standby compressor motor has not yet been tied in on this new system of control. These motors operate at 720/375 RPM, with a resultant choice of eight major tonnage output combinations. Since each motor is remote-controlled for full or half speed, the following loading is available:

1. 250 hp., full speed.....	250 hp.
2. 150 full, 100 hp., half speed.....	200 hp.
3. 100 full, 150 hp., half speed.....	175 hp.
4. 150 hp., full speed.....	150 hp.
5. 250 hp., half speed.....	125 hp.
6. 100 hp., full speed.....	100 hp.
7. 150 hp., half speed.....	75 hp.
8. 100 hp., half speed.....	50 hp.

The first basic principle was the selection of motors to provide for flexibility in tonnage, while also maintaining good power factor and motor efficiency. Squirrel-cage 2-speed motors were chosen instead of synchronous or wound-rotor types because of the automatic control functions that were desired for this system. Across-the-line reduced-voltage starting equipment of

Full schematic illustration
of brewery wiring is presented
on next two pages

reasonable cost was therefore feasible, which made possible the sequence control of these motors in the close supervision of demand peaks, and also the automatic functioning of compressor line valves in step with this regulation.

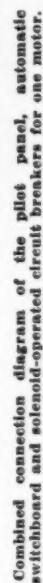
Each motor has its own pilot or push button panel adjacent to it. From this master control point the control connections are run to the automatic switchboard panels in a room above the compressor room. Here each motor is provided with four separate solenoid-operated oil circuit breakers for starting, running, high-speed windings, and low-speed windings. The two latter transfer breakers are mechanically as well as electrically interlocked to prevent any remote possibility of both windings being switched on the line together. The solenoids are energized from a rectified d.c. source. Mercury timing relays are interposed to provide a 13-sec. period between the transposition from high-speed to low-speed motor windings, or vice-versa. Automatic supervision of both motors is provided from the demand limiter panel, and also from the outlying valves. An 11-sec. time interval is provided between their starting.

Electrically-operated pilot valves are used at several outlying points, which in turn control piston-type system valves. These valves, together with the compressor by-pass valves are all coordinated with the automatic motor control and the demand control equipment. They unload the compressors before a 2-min. operating period can build up an excessive demand peak. The compressor valves remain closed during starting, and open automatically during running periods, without manual operations. In case of voltage failure, their valves operate automatically to prevent the backing-up of ammonia into the shut-down compressor, which would in a short time freeze it and either cause serious damage or in any event cause an annoying delay in resuming operations.

The demand control equipment is adjustable to certain desired peak limits, and is also adjustable as to timing the load-relief relays. This latter period may be set to operate within a 10-sec. interval. By the gradual adjustment of these relays, this plant's 525 kw. total connected load was so controlled that its initial 2-min. operating peak of 395 kw. was regulated down to 305 kw. This was accomplished without interference to operations or without restricting production.

A compressor shut-down during the cooling of hot beer would spoil it. Therefore, a battery-operated alarm system is connected through relays to the demand controller panel. In case of power failure, an alarm is sounded for 6 sec. at the brew house valve station. A red signal light also operates from the power circuit when the control system only is interrupted. Thus a positive indication of trouble in the refrigeration system is instantly relayed to the brew house. This permits stopping the flow of perishable beer if a prolonged shut-down is likely to occur. If the red signal lamp is burning, thereby indicating only a temporary shut-down of the compressors, it is not necessary to shut off the flow of beer.

100 HP WILL BE DUPLICATE



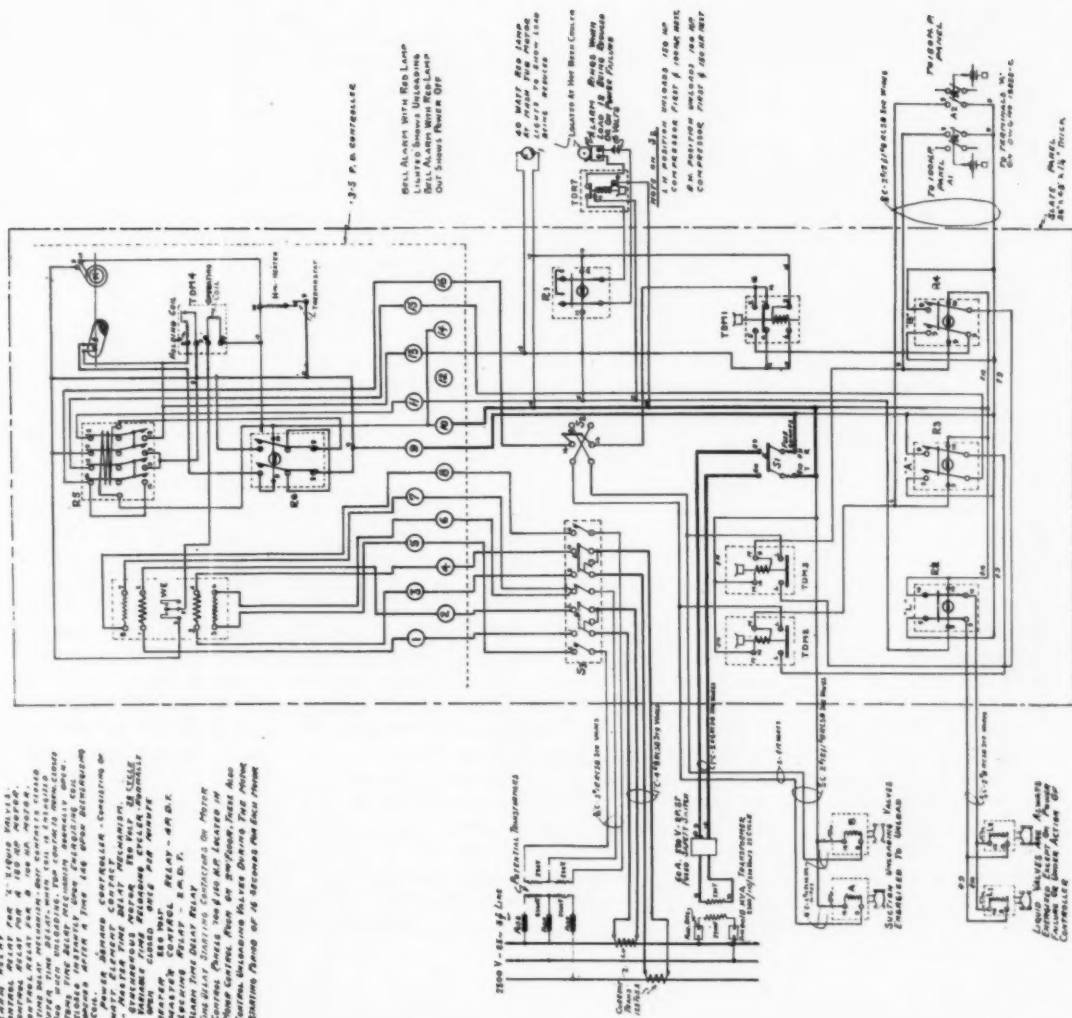
Automatic Control for Iroquois Brewery

for explanation see page 9

PUSH BUTTON CONTROL PANEL
117 FLOOR

Connections for automatic valves and load limitation equipment.

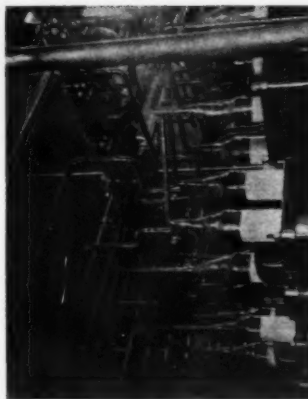
— LAMPING —
 1. 115V. 60Hz. AC. POWER SUPPLY.
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Remote-controlled switchboard for one 150 h.p., and one 100 h.p. squirrel-cage two speed compressor motors.



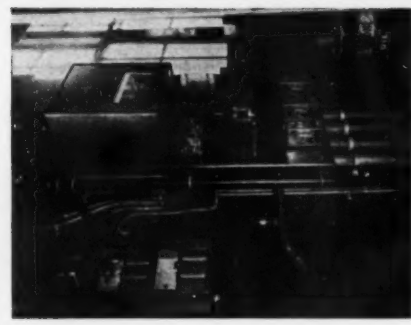
Solenoid-operated motor control oil circuit breakers at rear of control board, with their operating mechanisms aligned upon steel floor sills.



Insulated bus structure above the oil breakers, with current transformers arranged upon a horizontal pipe frame in the upper background.



Each motor is started from a simplified control panel with an indicating ammeter and "High," "Low," and "Stop" buttons and pilot lights.



The peak load limiting and compressor unloading panel, with the compressor shut-down alarm cabinet at the left.

A Voluntary Agreement of Fair Competition

By Laurence W. Davis

General Manager, National Electrical Contractors Association

THERE has been an increasing appeal from many local associations for a form of voluntary agreement to replace the former NRA code, but which would be free from any element of restraint of competition or that would require some force outside of the subscribers to the agreement itself for its enforcement.

Those who were close to the enforcement problems under the NRA code were impressed with the difficulties of any plan for regulating bidding without the cooperation of the awarding authorities themselves and of all other agencies who are parties to the present system of bid taking.

To be effective that type of regulation required the placing in the hands of an administrative body of the determination as to charges against alleged violators of such a code, with practically supreme power to punish any bidder in their discretion by denying him the award. The NRA code at its best was difficult to enforce; it was, furthermore, subject to abuses which could defeat its whole intent of fair competition.

In seeking a substitute for regulation of bidding prior to the award of a contract the following paragraphs from the "Price Terms Filing Provision," as approved by the Federal Trade Commission, have been studied for adaption to the competitive conditions affecting electrical contractors:

"The Industry approves, as being in the public interest, the gathering and dissemination of facts, statistics and information pertinent to intelligent operation of the Industry, for which purpose there will be established a central agency.

"Each member of the Industry shall file with such central agency, for dissemination by it to the members of the Industry who have similarly filed and to the trade, its prices, discounts, rebates, commissions, allowances, whether guaranteed against decline in price, and

all other terms and conditions of sale, hereinafter referred to as price terms, at which such member sells or offers to sell to the trade its products of the Industry, and shall be free at any time to change said prices and terms of sale. When said prices and terms of sale are changed or revised, the same shall be immediately filed as in the case of original prices and terms of sale.

"No member of the Industry shall enter into any agreement, understanding, combination or conspiracy to fix or maintain prices or terms of sale, nor cause or attempt to cause any member of the Industry to change his prices or terms of sale by the use of intimidation, coercion, or other influence inconsistent with the maintenance of a free and open market."

With these fundamentals in mind and based upon the plans and experience of several groups of electrical contractors which have been operating under such an agreement with a high degree of success for a considerable period of time, a plan has been devised which is strictly a mutual agreement between the subscribers thereto, with a reasonable and adequate financial deposit for good faith and penalties for infractions in order to assure its observance.

Closed Transactions

The plan is based upon exchange of fullest information upon *closed transactions* only. It does not attempt to interfere with free and open competition nor to interfere with the award of any contract to any bidder, but it binds its members to certain agreed-upon penalties for any disregard of sound estimating practice, for errors or carelessness in preparing estimates, or for unfair competitive bidding.

The plan does not require all or even a major part of all electrical contractors within the area of the agreement. It has been successfully operating in one large city with less

than one-third of the electrical contractors participating in the agreement. The experience of each group operating under this agreement has shown that the old fear of outside competition is unfounded and 90 per cent of all of the competition coming under these agreements has been within the membership of the groups themselves.

No Forcing

The agreement should not be put into effect until every individual subscribing to the plan is completely and fully sold upon all of its provisions. No attempt should be made to force its acceptance by the action of a majority in obtaining the reluctant signature of any individual only half sold. If the amount of the cash bond for faithful performance is an obstacle to obtaining the acceptance of the plan by a desirable member, such difficulty can be met by accepting the individual's notes for the necessary part of such bond payable monthly or at reasonable intervals.

Such a plan as this leads to a more intelligent operation of the industry and of the members' business. It raises the standard of estimating and establishes a mutual confidence that results in fairer competition, fair and reasonable profits and a higher standard of services to the public. It also provides an adequate income for the support of local association operations that will permit of increased effective cooperative work for the further improvement of the industry and of the members' business. The source of such association support, as well as the members' individual profits, can only come from the price at which the contractors' services are sold to the public. The plan provides an orderly means for assuring these essentials.

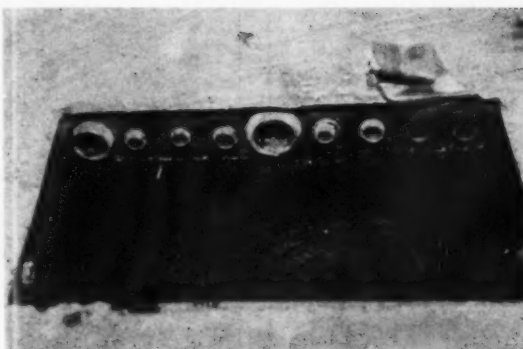
Copies of the voluntary agreement may be obtained by any group of electrical contractors from the N.E.C.A.



Radio Station Grounding Practice



Hundreds of feet of bare copper grounding conductors were installed between the metal lath nailing strips and the rough masonry walls. Occasional roofing nails were driven into the mortar to keep the wires somewhat in place. Welds were made at all junction points. Several risers were brought up from the foundation base to interconnect the concealed system.



Conduits may be considered well enough bonded at various places along the wall, but as a final precaution the conduits which end at this floor collecting box are all stubbed through a sheet copper cabinet lining. Extra copper may be seen at the right for connecting to a grounding conductor that will be brought into this under-panel junction box later.

Sheets of copper were used to bond metal window frames, doors, etc. Here a strip of copper is run up to the sill and is walled in to emerge again at a convenient connecting point along the frame member. The lower end is crimped and soldered to a horizontal bare ground wire, and then extends to the floor where it connects with a leader rising from under the foundation wall.

EFFECTIVE grounding methods were considered paramount to successful radio broadcasting when the new WOKO transmitter station and building were recently constructed at Albany, N. Y. In making this installation, the Stearns Electrical Construction Corporation provided a grounding and bonding network which grounded every panel of metal lath, every metal window, door, grill or other structural unit which could offer any possibility of radio-frequency harmonic interference.

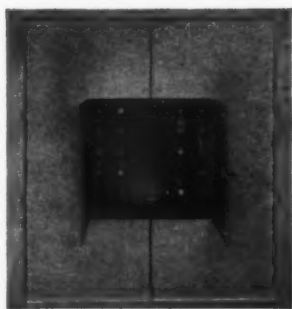
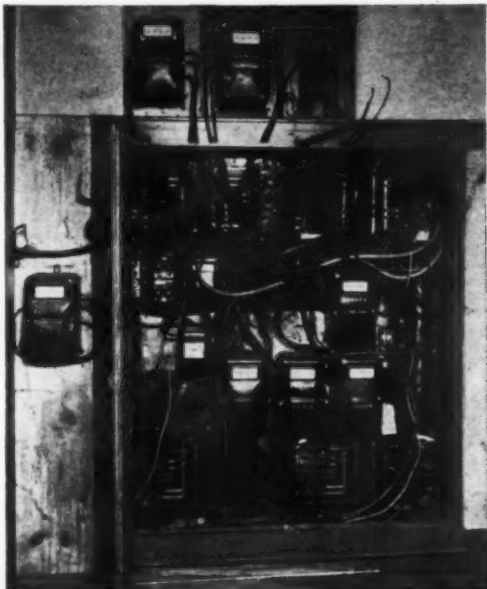
A system of No. 8 and 6 solid

bare copper conductors was run around all the interior wall areas from the floor to the roof. Laterals were tapped for risers in various sections, and all these taps were carefully welded to avoid the possibility of resistance at such junction points. Flat sheets of 4-in. wide copper were run along the interior walls to connect with various window and door frames, these sheets being crimped around and soldered to the bonding conductors.

The network of grounding conductors was connected at several points with a No. 6 wire ground

bus which was installed under the foundation wall for its entire perimeter. The usual system of buried grounding mesh and radials was installed out of doors and the station system was connected to it, while the entire system was connected to grounding conductors that were submerged in a nearby pond. The site was selected because of this pond and the consistently damp soil condition thereabouts. With this extensive outdoor grounding network and the care that was taken to ground the building also, good operating conditions are expected.

REINSPECTION GETS RESULTS



An old-time metering panel for a store and office building, wherein additions and tampering had created a menace to safety and property. Remodeling operations resulted from a reinspection survey.



The distribution center in a ten-story office building before and after a hazardous overload condition was corrected. This installation was reported to the owners under regular reinspection procedure.

DUE to an orderly year-round program of electrical investigations that is carried on in Cleveland, Ohio, the larger commercial and industrial occupancies in that city are steadily being cleared of dangerous hazards. Although only six men are available for all types of electrical inspections, the city inspection department staff visits all such premises at least once

each year. The inspectors are required to write up reports of all hazardous conditions that come to their attention, to be kept for future reference.

Because of this regularity of reinspection, the gradual growth of hazards is checked. As services, distribution centers and other parts of a wiring system become overloaded or otherwise hazardous, the

inspector can make properly timed recommendations. Old installations may be operated with safety up to certain limits, but when alterations or extensions are attempted, the proper steps can be taken to clear up the entire system. Moreover, as new installations become abused after several years in service, they can be checked up before serious hazards accumulate.

Selection Of Wiring Devices

For Industrial Use

FACTORY managers are relentless in their efforts to reduce maintenance costs and to increase the safety of operations. Wiring devices play a large part in the accomplishment of these two objectives, for their careful selection can do much to offset the abuse and mis-use which is their lot at the hands of non-electrical factory workers. The expense of replacement, the time lost while the machine is shut down, and the disturbance to production schedules, can be avoided if wiring devices designed for the use to which are to be put are used.

Safe equipment is equally as important. Every ac-

cident tends to increase the basic rate for compensation insurance, and in addition the immediate cost of lost time and replacement of experienced workmen is a burden upon every factory budget.

Economy and safety are not assured, however, by merely using the highest priced wiring devices. There are many factors which determine the right kind of device to use such as severity of use, frequency, location, atmosphere, etc.

The following comments will show how various wiring devices can meet the dual industrial requirements, economy of maintenance, and safety.

FLUSH SWITCHES

For economy

1. A cheap single-pole switch costs less than 10 cents, while a high-grade one costs about 50 cents; but a high-grade device should out-last a cheap one by more than five to one. In addition, replacements cost money in labor and lost machine time as well as in material.

2. Switches which carry the special "T" rating of the Underwriters' Laboratories should be used for the control of all type "C" lamp circuits, and their excellence justifies their use also for heating and power circuits.

3. If switch handles are exposed to heavy blows or other abuse, rubber or metal handles should be specified to reduce breakage. The small extra cost of an indestructible handle will be repaid many times over in reduced maintenance expense. As an alternative, a "recessed" switch may be used. This fits under a "recessed" plate so that the switch handle being behind the wall surface is protected from all but deliberate breakage.

For safety

1. High-grade switches have "insulated yokes." This means that the mounting yoke is fastened to the switch casing, and is not even close to any current-carrying parts. If there is a breakdown in internal insulation, the yoke cannot become alive. This is important where a switch is installed on an ungrounded machine.

2. On ungrounded circuits, dou-

ble-pole switches which break both sides of the circuit are desirable if the circuit feeds motor-driven machinery. This is a safeguard against getting a shock for instance, when replacing or adjusting motor brushes.

RECEPTACLES

For economy

1. High-grade receptacles have rugged current-carrying parts, larger contact area, and—in many cases—special alloy metal contacts; these all guarantee long life under severe service which would soon destroy cheap, light-duty devices.

2. "T" slots should be specified, for receptacles with parallel slots are not sufficiently universal for industrial use. Some manufacturers of portable tools, and office equipment still use tandem-blade caps.

3. Receptacles on "heavy duty" circuits must be rated at not less than 20-amp., according to the National Electrical Code. Because of their rugged construction, 20-amp. receptacles are also desirable on any circuit to which motor-driven portable equipment may be connected. Usually this equipment is switched, but industrial employees are so likely to break the circuit by pulling the cord cap out of the receptacle that this device is subjected to extremely severe service.

4. Polarized receptacles are essential for special-duty or special-voltage circuits to which only certain types of apparatus should be connected, in order to avoid damage to apparatus by plugging into the wrong circuit.

For safety

Installation of three-wire receptacles for the connection of all portable tools will permit the use of a ground conductor between the case of the tool and the permanent wiring system conduit ground. All danger of shocks from an electrically alive tool frame is eliminated by this means.

LOCK RECEPTACLES

For economy

1. Long, heavy cords on portable equipment may put so much weight on an ordinary receptacle that the cord cap will be pulled out thereby wasting a workman's time. Lock receptacles eliminate this trouble, for once a cap is twisted in a receptacle it cannot be pulled out accidentally.

2. Lock receptacles are as effective as polarized receptacles on special circuits, since only equipment provided with twist-lock caps can be connected.

PILOT AND SWITCH OR RECEPTACLE

For economy

1. A pilot in combination with a switch will prevent waste of power in cases where the switch is located out of sight of the heating device or other equipment it controls.

For safety

1. Pilots are a necessity with any electrically heated device on which the temperature is not limited by a

Common Errors

IN THE INDUSTRIAL APPLICATION OF WIRING DEVICES

	Wrong	Right
1	Switches installed in hazardous locations, with only regular flush plates.	Switches in hazardous locations must be enclosed in approved explosion-proof housings.
2	The use of switches with yokes which are not widely separated from all current-carrying parts as on machines with ungrounded frames.	Switches for this use should have totally insulated mounting yokes.
3	Light-duty switches on type C lamp circuits.	Switches for this use should carry the Underwriter's special "T" rating, on all except light-duty lighting circuits.
4	Standard flush switches and receptacles out-of-doors.	Weather-proof devices should be used for all outside installations.
5	The use of 1-amp. or 3-amp. canopy switches for the control of individual ceiling fixtures using large lamps.	Ceiling switches, rated at 10 amp. or, in some cases, 6 amp. pendant switches, should be standard practice.
6	Flush switches with the standard moulded handles in locations where the handles may be hit and broken accidentally.	Switches with rubber or metal handles, or "recessed" type switches.
7	Parallel-slot receptacles on general duty circuits.	All industrial receptacles for general duty should have "T" slots, to take either parallel-blade or tandem-blade caps.
8	Standard flush receptacles on special-duty or special-voltage circuits.	Special-duty receptacles should be of the polarized type.
9	Standard flush receptacles and plates for floor outlets.	Water-proof floor receptacles should always be used in industrial plants.
10	Standard "T" slot receptacles on circuits feeding portable equipment, if care must be taken to avoid accidental breaking of the circuit.	Locking receptacles, should be used for this purpose.
11	Standard flush receptacles, plates, and standard attachment plug caps in hazardous locations.	Receptacles and attachment plug caps for hazardous locations must be of special types which (a) cannot be pulled apart while current is flowing, or (b) which seal the arc upon breaking the current. Also, must provide a connection for a ground wire between the portable device and the conduit system ground.
12	Ordinary flush plates, with sharp corners, on conduit or other surface outlet boxes.	Plates should be shaped to fit the boxes, to avoid the danger of projecting sharp edges.
13	Receptacles without pilot lights, if the receptacles will supply current to non-automatic heating devices.	Pilot lights should always be combined with receptacles which feed heating devices.
14	Ordinary moulded attachment plug caps on the cords of portable tools and equipment.	All-rubber, or cord-grip metal-armored caps should be used.
15	Brass-shell, or plain porcelain sockets in hazardous locations, on portable cord equipment.	Use moulded composition sockets on all portables in Class I and III locations; moulded composition or porcelain-in-metal-sheathing sockets in Class II and IV locations.
16	Brass-shell sockets in fixtures in hazardous locations.	Use composition or porcelain keyless sockets in all hazardous locations. Usually, they must be a part of an enclosed fixture.
17	Metal-shell sockets in locations exposed to dampness.	Composition or porcelain sockets are essential, as the linings of metal sockets may absorb moisture and lose their insulating value. The screw shell and current-carrying parts are preferably cadmium-plated. Sockets should be keyless if within reach of a wet floor.
18	Brass-shell sockets in hot locations.	Composition or porcelain sockets should be used, and they should be assembled with high-heat cement.
19	Pull-chain or pull-cord sockets close to moving machine parts.	Key, push, or keyless sockets should be used, as chains or cords may be caught in the moving parts and broken off.
20	Sockets with threaded or plain bushed caps on pendent cords.	Sockets with strain-relief or cord-grip caps are preferable. If a cord-grip cap is used, the grip should be of the proper size for the cord it is to hold.

thermostat, to avoid overheating and fire when left unattended.

HIGH-HEAT DEVICES

For economy

1. Sockets and switches may be obtained which are assembled with high-heat compound instead of the usual wax. These devices should be used in particularly hot locations, such as over boilers, near ovens, etc.

SOCKETS

For economy

1. Soft rubber sockets are now available, and their use will eliminate much breakage.

2. Sockets with cord-grip caps are desirable, since the cord-grip eliminates strain on the connection terminals, thereby reducing repairs.

3. Ordinary key sockets, rated at 250-watts, may not give satisfaction under severe industrial service. In any doubtful case, sockets rated at 660-watts should be installed to assure maximum life.

4. Theft of lamps can be prevented by installing lock-sockets. For special cases, the same result can be obtained by installing left-hand-thread sockets, which of course must be used only with left-hand-thread lamps.

5. Sockets installed in locations subject to vibration should be equipped with lamp grips.

For safety

1. Articles 32 and 33 of the National Electrical Code should be closely observed when installing sockets in hazardous locations. Weatherproof sockets must be used in damp, or wet places, or where corrosive vapors exist; this, of course, means rubber, porcelain or composition shells. And sockets must be keyless if installed over inflammable material.

2. Porcelain or composition shell sockets are desirable over machinery connected to ungrounded circuits, and these sockets should be protected against breakage.

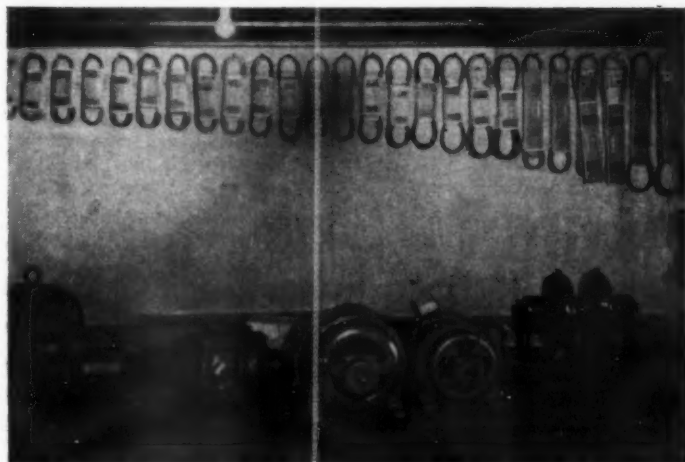
3. Key sockets, where installed over machinery, should be of the type which has a collar or other protection around the key shaft where it passes through the brass shell. If not protected in this way, the shell may become alive. Such a socket over a lathe, for instance, may kill or injure anyone who touches both brass shell and machine.



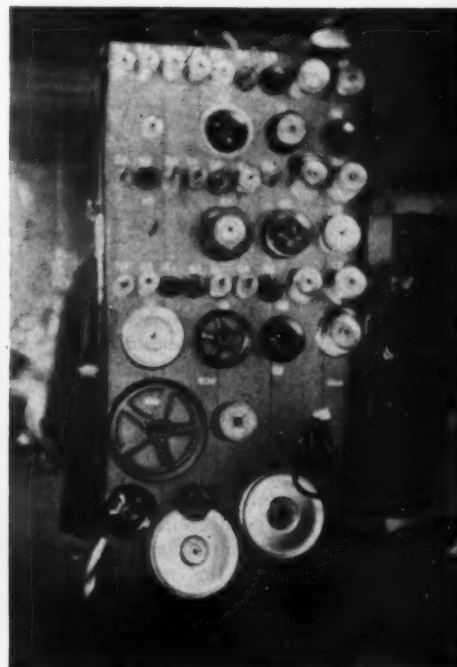
This wall shelf located beside the office door contains a few items which add sales



Heavier wooden and paper pulleys require more sturdy shelves, and enough space to allow free access to the size that is needed. Here again the customer is impressed with a ready stock



V-belts in numerous sizes are arranged on the second floor wall in the used motor display space. These are in addition to a large portable display rack at the first floor entrance

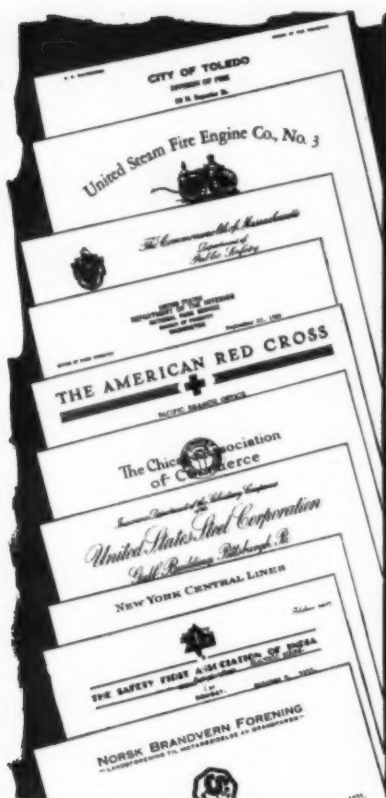


Flanking the opposite side of the aisle to the shop is a peg-board with V-belt pulleys of various sizes. Price labels are provided at each peg

Displays Staple Motor Supplies Profitably

A PRACTICAL and inexpensive arrangement for displaying what is needed for small motor drives pays for itself at the Mather, Evans and Diehl Company, Inc., Utica, N. Y., enough so that an average inventory of about \$500 to \$600 in small paper and steel pulleys, couplings, V-belts and pulleys is maintained. These items are kept where they can be seen and where they are accessible to the customer or the shop. No elaborate shelving has been built, only enough to permit the display of these items in a manner which allows anyone to fill an order quickly.

Despite keen competition from hardware and mill supply houses, this modest arrangement is a source of steady revenue. Because customers are confronted with this display when they come to this company's office, they buy these small items, as well as having their repair work done.



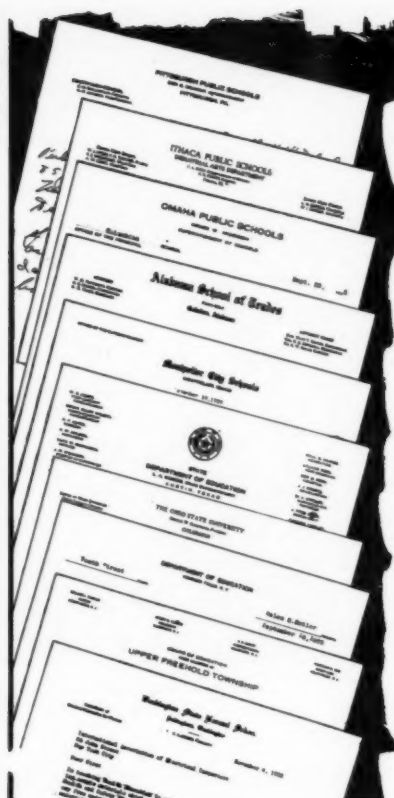
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requests for material from governmental, municipal, civic and commercial organizations



391

newspapers carried more than 25,000 column inches of publicity



194

school systems and colleges participated

AT NO time has the public of this country been so thoroughly aroused on the subject of safety as it is at the present time. While the great impetus has undoubtedly come from the national effort to reduce the hazards of automobile driving, the effect has been to make the public generally safety conscious for the first time. As a result, electrical safety now has an actively interested audience.

For the past three years the International Association of Electrical Inspectors has been engaged in a campaign of public education. Its aims are to secure the public acceptance of inspection, wiring by competent contractors, and the use of safe, approved cords, materials and appliances. Starting in a small way, this educational effort has slowly accumulated momentum. A growing number of inspectors and fire chiefs have cooperated in local educational efforts. Exhibition dis-

The Public Interest in Electrical Safety

By James A. Smith

Director of Educational Promotion, Public Relations Committee, International Association of Electrical Inspectors

play boards have been created and shown to large audiences. One insurance company has cooperated to the extent of developing a film, largely devoted to electrical fire hazards, as well as creating animated display boards. Superintendents of schools, directors of home economic bureaus, and officers of parent teachers' associations have shown a rapidly increasing interest in the subject, and are using the material furnished by the committee to further this educational program.

The high point, however, was reached during Fire Prevention Week, when the campaign, which is very modest in its expenditures and efforts, developed an overwhelming public interest in the subject of safe wiring in the home. It has been estimated, and rather conservatively, that the publicity circulation on this subject during Fire Prevention Week, was in the neighborhood of twenty millions. Some of the figures

50,000 educational charts
300,000 home inspection blanks
78,000 booklets
2,000 newspaper mats

publicity appeared in 391 newspapers.

The illustrations on the opposite page show the character of the participating organizations.

The campaign featured first, approved cords and appliances; second, the proper care and use of cords and appliances; third, installation only by qualified contractors; and fourth, proper inspection.

releases, and the widespread character of participating organizations and institutions, make it apparent that the public is very definitely interested in the subject of electrical safety. The spectacular results thus secured with such a small amount of effort and expenditure open up attractive vistas of possibilities for a well-organized campaign with wider participation by the electrical industry.

IN selling reconditioned motors on the deferred payment plan, the financial responsibility of the purchaser is of primary importance. "I do not put so much faith in the credit rating organizations as I do in direct, personal investigation," says R. O. Johnson, vice-president and manager of the Robert Skeen Electric Works, Portland, Ore. "In the case of a buyer whose standing is unfamiliar to me, I check first among the people in his own line of business and then upon those from whom he would be apt to buy.

that the down payment was not sufficient to clear us if the windings burned out, or if for any reason he could not continue with the arrangement. I therefore suggested \$20 down payment, which was secured.

Title

"Finally, a motor sold on the deferred payment plan is in effect nothing but a rented motor until such time as it is paid out. It is therefore necessary that the dealer be sure the title remains with him until such time as the payments have been made. Any laxity in seeing to this may result in trouble from more than one cause—fires, financial failure of the purchaser, etc.

"Make out a conditional sale document in the case of all important orders. I find that the ordinary standard form which can be secured from the stationer is sufficient. The one shown here is for either lease or

conditional sale of goods. Occasions will arise where a customer who is apparently a desirable one will not come to the point of signing the paper then and there, but insists that the motor be sent out and that he will take care of the payment when it arrives. Rather than lose the sale by strict insistence on the formality at the moment, we agree to this. For such cases, a stamp has been made as shown here and the shop order so stamped. When the motor is delivered and the initial payment made, he is required to sign the stamped paragraph under 'conditions.' This, we have found, covers us adequately in the matter of title and rights of possession."

Check credit carefully, see that the down payment is sufficient and be sure that title remains with the seller until paid out are the cardinal principles under which Mr. Johnson operates.

CONDITIONS

The title and right of possession to the apparatus specified herein shall not pass to the customer until all payments hereunder shall have been fully made in cash, and the customer agrees to do all acts necessary to perfect and maintain such retention of title of said apparatus in the Skeen Electric Works.

Signed

NO. 9974. LEASE ON CONDITIONAL SALE OF ROADS

Printed and for sale by Bliss & Bingham Company, Portland, Me.

This is to Certify, That _____, herein
designated as the lessor, has this day leased to _____
herein designated as the lessee, the following described goods and chattels:

The said lease... hereby except... possession of said goods; and chemists, which are of the value of \$_____, Dollars (\$ _____), and agree... to pay the lessee... therefor upon the following terms and conditions:

The lessee... shall pay upon the signing of this agreement the sum of \$_____, and upon the ____ day of _____ next thereafter the sum of \$_____.

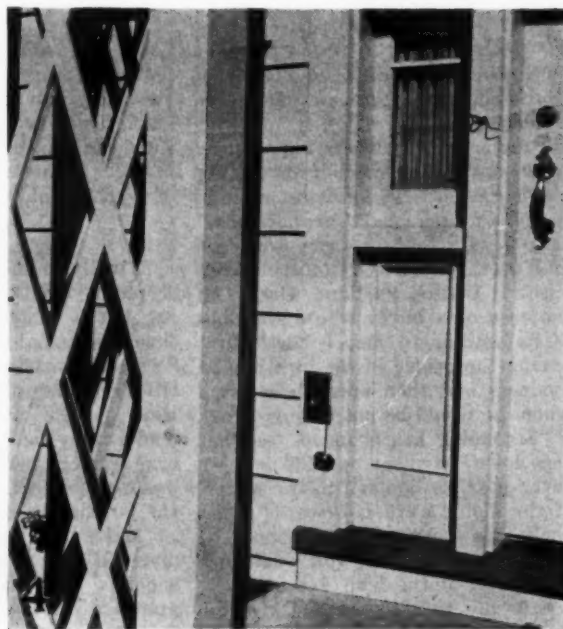
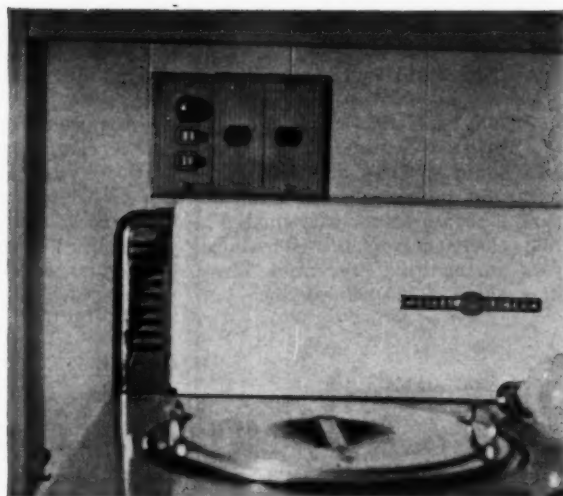
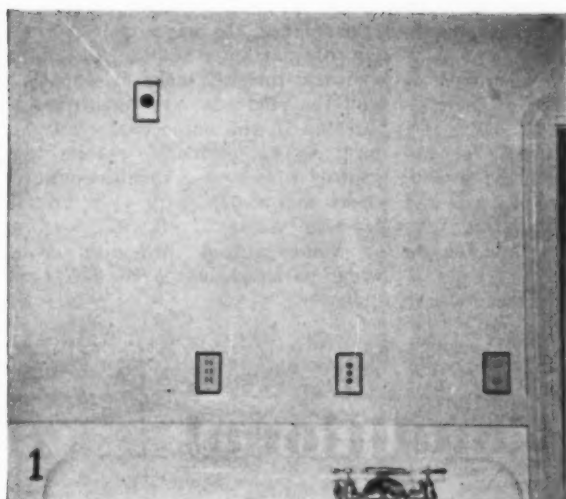
[illegible]

IN WITNESS WHEREOF, The said parties have hereunto set their hands this _____ day of _____, 19____.

_____ day of _____, 19____.

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Lenses

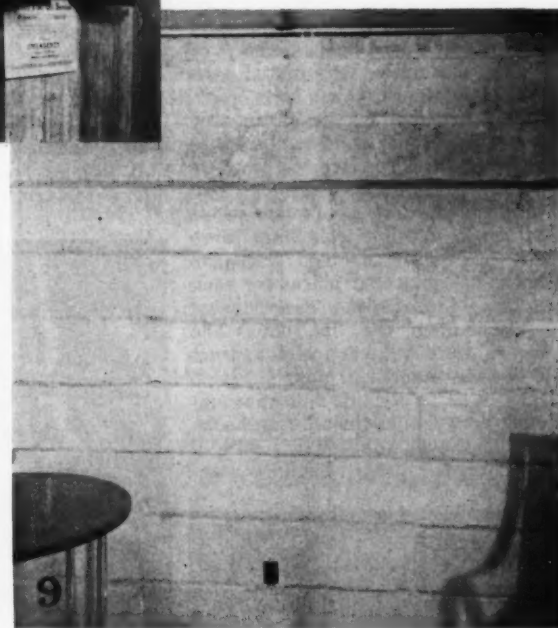
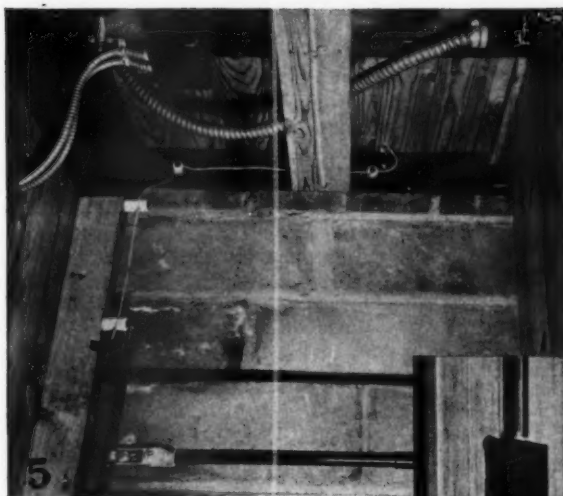


PRACTICAL WIRING ADEQUACY for Small Speculative Home

IN laying out the lighting of a \$7,900 speculative home at Rochester, N. Y. which was to be displayed as a model, the Electrical Association of that city also provided a practical wiring layout to give the future owner electrical safety and adequacy.

Wiring details were coordinated with the building plan with the result that a minimum amount of exposed work was necessary. Although this home will be viewed primarily for its correct lighting, the other

features of adequate outlets, convenient switching, generous circuiting with No. 12 wire, and neat workmanship, make this small home an example of good residence wiring practice for speculative houses. The work was done by Frederick A. Martin, a local electrical contractor, under the direction of Edward J. Kramer, manager of the Electrical Association, which sponsored the "Correctly Lighted Home," in conjunction with a local newspaper.



1. The kitchen clock outlet, a triple convenience outlet, a gas heater remote control push button station, and two kitchen lighting switches were placed above the sink and drain. There are five kitchen convenience outlets, four being the triple type. These are divided on three circuits with the basement laundry outlets.

2. A compact combination outlet was placed near the door leading to the basement stairway, having the basement switch and pilot light in tandem with a kitchen 3-way switch. Ganged to the right are sectional composition plates which cover the bell transformer and a combination bell and buzzer.

3. Flush illuminated house numbers, and a flush entrance ceiling light, each

separately switched indoors, will guide future night callers into this home.

4. The Christmas decorative outlet on the front entrance is also inside switched.

5. Certain unavoidable exposed work was concentrated in a basement storage room. The ground connection for three radio outlets, and service ground wires connect here to the water line, while the panel feeder was extended up in this space with flexible steel conduit to the panelboard. Junction boxes for circuits leading down to basement outlets were kept in this closed-off space.

6. The 14-circuit panel serving this home has been placed on the first floor in the service entrance vestibule.

7. Neat and substantial construction was provided for the motors operating the oil heated furnace and its circulating fan. A basement switch was made flush with the stairway side of this board partition.

8. Planned locations for the heating system permitted the $\frac{1}{2}$ -in. conduit runs to the oil burner motor and to the circulating fan being concealed in the concrete floor. Lead-sheathed wire was used in the floor runs, and spliced to rubber covered wires in the wall junction box.

9. Low-cost concealed wiring was provided for the basement den or play room by fishing down to several convenience outlets with armored cable in the hollow cells of the concrete block foundation wall.

Construction . .

Methods

Pre-Assembled High-Up Conduit Racks

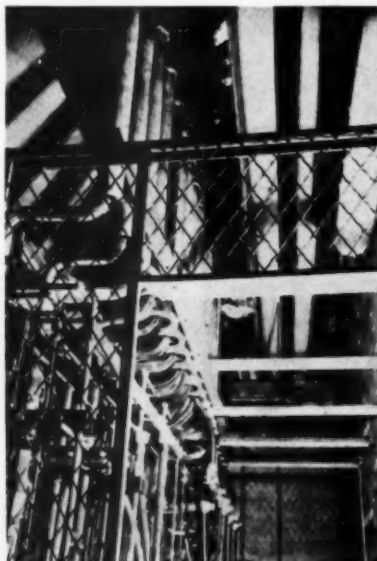
Pre-assembled vertical racks equipped with J-hooks, were used for supporting the feeder and control conduits that were installed by Joseph Newman, Inc., on the contactor runway in a new armory at Jersey City, N. J. Because this work had to be done on a steel-latticed walkway near the domed roof, far above the tiers of seats, this advance assembly of hanger materials eliminated the handling of many small bolts, nuts, washers and pipe clamps in an area where these items could easily fall to the lower level. After the various horizontal conduit positions had been decided upon, a complete set of $\frac{3}{4}$ -in. by 2-in. flat iron bars were made up which included flat iron J-hooks at the proper places for each conduit. These hooks were riveted in place upon the flat bar. The hangers were set vertically against the runway hand rail and bolted in place. When a conduit run was completed between cabinets, the hooks were bent over the conduit with a sharp hammer blow. Eight contac-



tor cabinets are shown connected to a distribution cabinet at the left, which employed a gradually reduced number of conduits. The first section consists of one $3\frac{1}{4}$ -in., three 2-in., six $1\frac{1}{2}$ -in., and one 1-in.

Rear-of-Board Conduit Strapping

A compact and uniform spacing of twenty feeder conduits was rigidly supported by Langdon & Hughes Construction Company in connecting the main switchboard of a new high school at Utica, N. Y. Vertical conduit nipples from an overhead pull box were terminated at the rear of

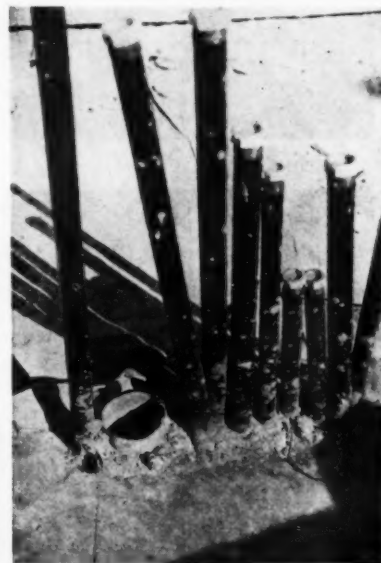


this switchboard and strapped to a horizontal angle iron straight-edge which in turn rested on the switchboard wall braces. The line of conduits was kept back of the buswork to provide safe clearances from live parts and to provide easy cable pulling clearances. By leaving the pull box near the ceiling and nipping down with separate conduits, the outgoing feeder conduits could be racked in a horizontal plane to cor-

respond with the corridor racking height, thus eliminating off-sets in twenty conduits.

Large Sleeves Allow Conduit Changes

The tendency to place lighting panelboards in cramped quarters of residences makes it advisable to provide large feeder conduit sleeves. In this illustration the location for a 32-circuit lighting panelboard had to be changed just far enough to require the removal of a $\frac{3}{4}$ -in. conduit



run. This conduit may be seen broken off next to the concrete floor in the left foreground. Because an oversize feeder conduit sleeve was installed between the stubbed-up branch circuit conduit runs, it will be possible to run a new exposed $\frac{3}{4}$ -in. conduit from the basement ceiling and bring it into the panelboard alongside the feeder conduit with a minimum amount of concrete chipping. This condition occurred in a Westchester County, N. Y., residence which is being wired by Miller-Brown, Inc., New York, N. Y.

Surface Mountings for Unit Heater Controls

The installation of unit heaters in a silk throwing plant required thermostatically operated Mercoid switches to be mounted upon timber columns in various areas. These devices were therefore mounted directly upon standard octagonal outlet boxes from which the branch conduits were run to the motor thus controlled. This method eliminated

THE MAINTENANCE MAN SPEAKS HIS MIND



"I'M THE HOUSE PHYSICIAN. I DOCTOR SICK MACHINES. AND, BROTHER, I KNOW SOMETHING ABOUT SAFETY SWITCHES. I CERTAINLY KNOW WHERE TROUBLE STARTS. NOT WHERE YOU THINK, BUT IN SOME DETAIL...IN SOME OVERLOOKED, UNFORESEEN, SLIGHTED OR FORGOTTEN DETAIL. I'VE LEARNED THAT A SAFETY SWITCH IS NO BETTER THAN ITS WEAKEST PART, HENCE ALL DETAILS ARE IMPORTANT. I KNOW THAT DETAILS ADD UP, AND THAT THE SWITCH WHICH IS PERFECT IN ALL DETAILS IS THE PERFECT SAFETY SWITCH. I'VE MARKED THOSE FACTS DOWN IN MY MIND.. I WON'T GO BACK OF MY EXPERIENCE."

DARE YOU SAY: JUST A WASHER?

BY ITSELF, a washer is of little value. But a safety switch is made up of steel, and insulation, and copper, and fiber ...each piece of which by itself is of little value. Yet, as part of an assembly, on which efficient operation, safety of property and lives depend, even a washer can be important.

Since no one can tell where stress is going to occur, nor where the blow will fall, since a safety switch can only be as good as the sum of all its details,

C-H Safety Switches are perfected in every part...the washers, for example, carefully cut from carefully selected steel with a reputation for "stand-up" in the duty it must perform. And when you see the kind of service these switches give, you will realize why they are featured by leading contractors and independent wholesalers everywhere. CUTLER-HAMMER, Inc., Pioneer Manufacturers of Electric Control Apparatus, 1306 St. Paul Avenue, Milwaukee, Wis.

● The C-H line includes all types and sizes of Standard, Weatherproof and Explosion-Proof Safety Switches, and Range Switches and Service Equipment for every locality — all built to the famous C-H Control Leadership Standards.



CUTLER-HAMMER SAFETY SWITCHES

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THE WIREMOLD COMPANY ♦ ♦ ♦ HARTFORD, CONN., U. S. A.

A "LIVE Baseboard — with Juice in it!"

WIREMOLD OUTLET AND LIGHT STRIP

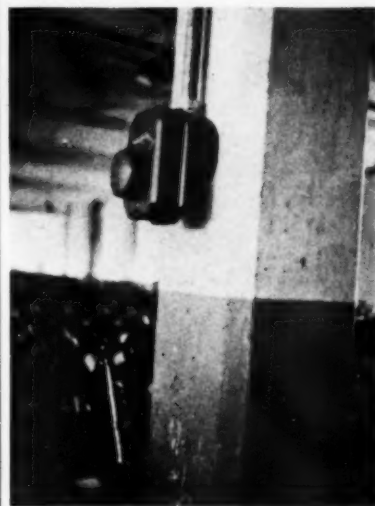


1. Provides for really **PRACTICAL CONTINUOUS OUTLETS** using solid, sturdy **STANDARD** Wiremold receptacles — durable and lasting!
2. Greatly simplifies the installation of **LUMILINE LAMPS**—and multiplies their usefulness.
3. Makes it easy to modernize stores with **WINDOW & STORE LIGHTING**—"novel effects at small cost!"
4. Provides a great variety of inexpensive **COVE, PANEL & BOX LIGHTING** combinations—easy to sell and install.

INSTALLED in all types of new or old buildings. No digging into walls or ceilings. Complete installations around room—or part way *only*, if desired (IN SECTIONS OF ANY LENGTH). Outlets added as needed—placed anywhere—singly or in groups! Makes them really convenient—and really continuous! Takes **NINE WIRES** (No. 12)—in a **SINGLE CHANNEL**! Send for special circular!

"Wiremold **HELPS** the Contractor!"

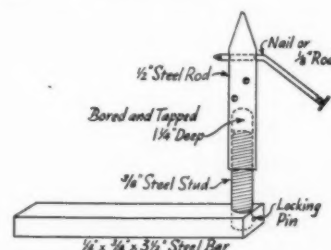
the need for open wire connections, as these were made to the back of the device and confined within the



outlet box. The work was done by Ralph S. Walter, electrical contractor of Bethlehem, Pa.

Jack-Screw for Removing Knockouts

A tool which may be placed in concealed outlet boxes for removing knockouts to facilitate installing additional "fished" wiring has been developed by Henry Fendall, an electrical contractor of South Ozone Park, Long Island, N. Y. This tool is set inside the outlet box with its screw point bearing against the punched-in knockout circle at a point opposite the retainer ear or uncut side. A 14-penny nail or $\frac{1}{4}$ -in. rod is used to turn the jack screw outward until the threading pressure has forced the knockout from the box wall. This method of knockout removal does away with hammering against the existing box, and the possibility of cracking the plaster or adjoining decorations.



The base is a $\frac{1}{4}$ -in. by $\frac{1}{4}$ -in. by $3\frac{1}{2}$ -in. bar of machine steel, drilled and tapped for a $\frac{1}{4}$ -in. threaded stud, $1\frac{1}{2}$ in. long overall. This stud is locked to the base bar with a small dowel

**The
EYES
of the
ELECTRICAL WORLD
are on
BULL DOG**



Next month we will
announce the most
revolutionary im-
provement in SAFETY
SWITCHES! Expect
great things!



NEW FEATURES:

Rounded Ends
No Ear Lugs
Increased Wiring
Space

No-Thread type in
all popular styles.

Threaded type in
all popular styles.

NEW

"Form 35" Appleton Unilets meet widespread demand

The new shape in Appleton Unilets, known as "Form 35," has important new features that improve installations. Note the rounded

ends of the cover opening. Likewise, the absence of ear lugs in the body provides more wiring space.

The castings, made in the Appleton Foundry under careful supervision, measure up to the highest standards of quality. They are made of malleable iron which gives them both strength and lightness.

The cadmium finish, used in all Unilets, provides positive resistance to rust and corrosion.

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Standard for Better Wiring

pin. The jack screw or point is of $\frac{1}{2}$ -in. round steel. This is $2\frac{1}{2}$ in. long and has one end turned to a bead point. The opposite end is bored out and tapped $1\frac{1}{2}$ in. deep to receive the $\frac{1}{2}$ -in. stud. Several holes are drilled through the $\frac{1}{2}$ -in. rod near the point to receive a 14-penny nail or $\frac{1}{4}$ -in. rod used in threading the jack while it is set up within an outlet box.

Rigid Conduit to Flexible Cable Change for Tight Places

In wiring gasoline stations there are certain switches required in window mullions. Often the complete run between the ceiling outlet and switch box cannot be made



with rigid conduit due to restrictions as to cutting or notching the headers. In the accompanying illustration a $\frac{1}{2}$ -in. conduit was run horizontally to the center above the right window frame and an armored cable connector was attached to a conduit coupling at that point. The armored cable that extends down to the switch outlet was stripped of sufficient sheath to permit its conductors to be continuous within the conduit to the first ceiling outlet. The amount of sheath thus removed saved the delay that would have been caused while waiting for a short length of $\frac{1}{2}$ -in. flexible steel conduit and a connector. The foregoing method was employed by Frank E. Baldwin, electrical contractor of Wilkes-Barre, Pa.

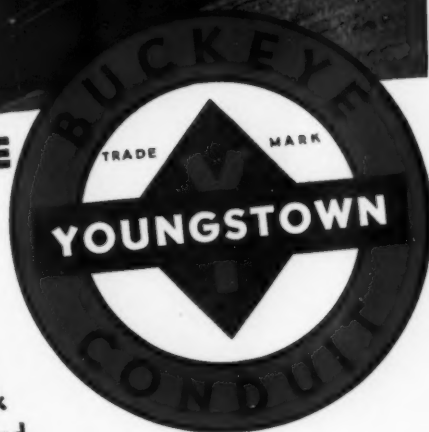
Nail-Shielding Shallow-Notched Cable

The installation of additional outlets in a remodeling job at Buffalo, N. Y., necessitated the guarding of some armored cable runs for which shallow notches only the thickness of



IT PAYS TO USE DEPENDABLE

●The consistently good working qualities of BUCKEYE conduit, the ease and uniformity with which it can be shaped and bent, its ability to take quick, accurate threads, and the tight adhesion of its three finishes all work together to accomplish one end --- a finished installation which, at a glance, clearly shows your good workmanship on the job.



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Manufacturers of Carbon and Alloy Steels
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*10 years old
67 years*



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Electrical Contracting, January 1936

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Graybar
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On January 1, 1926, a new name...Graybar...was born. As successor to the Supply Department of the Western Electric Company, Graybar continued an experience and a reputation for quality that started in 1869 . . . Since 1926, the scope of Graybar's service to the electrical industry has steadily increased. To buyers everywhere Graybar stands today not only as a convenient, economical source of 60,000 electrical items, but as an ever-active, friendly promoter of the use of everything electrical.

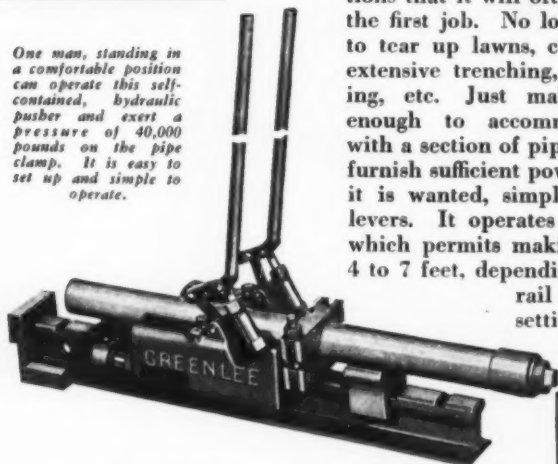


EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK

Electrical Contracting, January 1936

GREENLEE Hydraulic PIPE PUSHER

One man, standing in a comfortable position can operate this self-contained, hydraulic pusher and exert a pressure of 40,000 pounds on the pipe clamp. It is easy to set up and simple to operate.



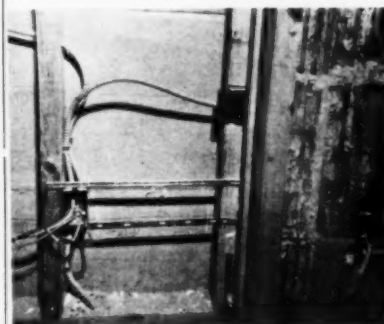
GREENLEE TOOL CO.
ROCKFORD, ILLINOIS, U. S. A.

Saves Time AND Money in Underground Installation

Here is a new Pipe Pusher that makes it so easy to make underground installations that it will often pay for itself on the first job. No longer is it necessary to tear up lawns, cut pavement or do extensive trenching, back-filling, tamping, etc. Just make a trench long enough to accommodate the pusher with a section of pipe, and one man can furnish sufficient power to send it where it is wanted, simply by pumping the levers. It operates on a notched rail, which permits making a push of from 4 to 7 feet, depending on the length of rail used, with but one setting of the efficient pipe clamp.

**WRITE
TO-DAY
FOR
COMPLETE
DETAILS**

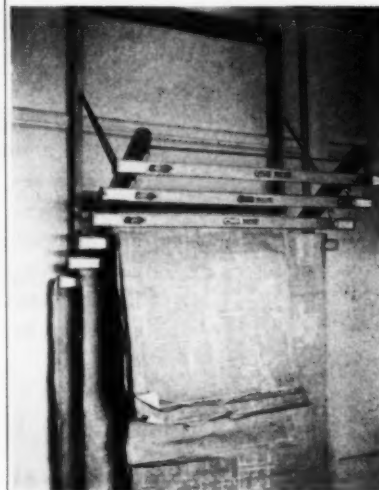
the cable could be made in the partition studding. Because a wood paneling finish was to be applied to these studs, the cable which passed through these shallow notches was shielded by bridging over them with the side wall of a sectional switch box. The Beacon Electrical Engineering and Construction Company was thus able to guard against the possibility of nails being driven



into their cable by the carpenters. Shallow notches were necessary at locations where slanting runs were taken to furred columns as illustrated in the lower right.

Compact Plan Rack

For keeping the plans for current jobs out of the way, yet readily accessible, Lindsay-Wright, Inc., New York, N. Y., has a small wall type rack. Six sets of plans may be hung on this outfit, each set being held together at one end by a two-piece wooden clamp strip. These strips each have two large screw hooks that engage similar hooks on the rack. The sets of plans may quickly be removed or placed on this rack because of this simple suspension method.



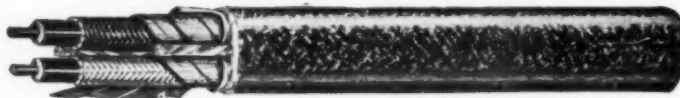
1889 *From Year to Year* 1936
ALWAYS DEPENDABLE



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APPLIANCE CORDS
BUILDING WIRE—All
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CONTROL CABLES—
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WIRES & CABLES
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SHEATHED CABLE
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CABLES
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AND ALL KINDS OF SPECIAL CABLES TO
MEET A.S.T.M., A.R.A., I.P.C.E.A., AND ALL
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CRESFLEX NON-METALLIC SHEATHED CABLE



ARMORED BUSHED CABLE—TYPE A.C.

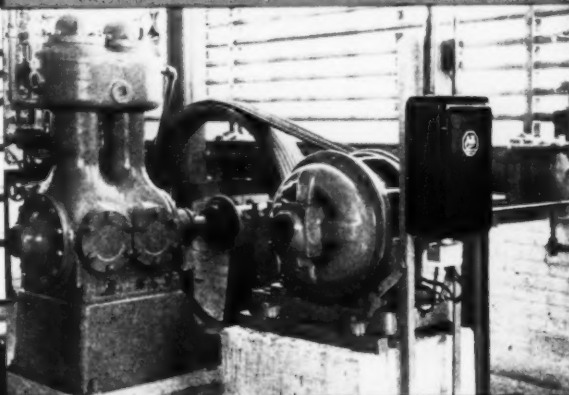
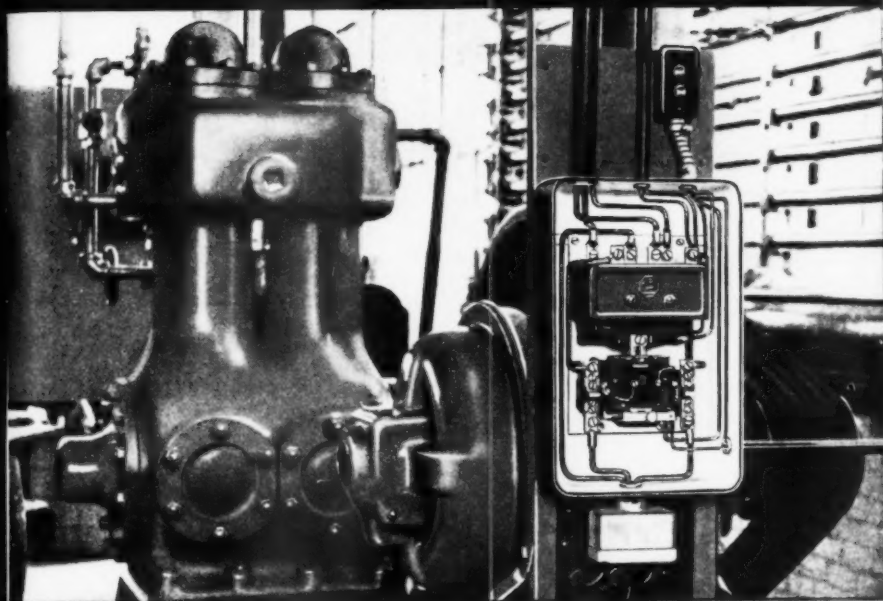
CRESCENT
INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY





*Easy
-to install
-to maintain*

ALLEN-BRADLEY BULLETIN 709 Solenoid Starters



No more contact "dressing" with the BULLETIN 709



*Bulletin 709, Size 3
Solenoid Starter*

You save time and trouble for yourself when you install Bulletin 709 starters. Contact dressing and contact welding will be things of the past. Once you have installed this remarkable starter, the only maintenance it requires is an occasional inspection. Installation is so simple that it is always easy to make a neat and clean looking job.

Bulletin 709 solenoid-type starters are made in three sizes, for motors up to 30 H.P., 220 V.; 50 H.P., 440-550 V. Write for descriptive bulletins and prices today, and consult your Allen-Bradley representative before placing that next starter job.

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● Maintenance-Free Contacts

The double-break silver-alloy contacts never need to be filed or dressed. They do not corrode.

● Ample Wiring Space

Compact starter mechanism permits unusually generous space for wiring in the cabinet.

● No Back-of-Panel Wiring

All electrical connections are visible and are accessible from the front of the switch.

● 12 Concentric Knockouts

Convenient knockouts are provided on all sides and back of the starter cabinet.

● White Interiors

White cabinet interiors reflect light for better illumination when installed in dark places.

● Removable Cover

Cabinet cover is removable, thereby providing easy access to the starter mechanism.

● An A-1 Job

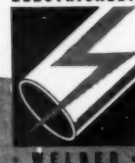
Attractive cabinet. Many knockouts make possible a neat conduit installation on every job.

ALLEN-BRADLEY



SEVEN YEARS

ELECTRICALLY



Patent No.
1,962,876



Knurled inside
finish available
in 3/8", 1/2" and
1" sizes.

and remember-

*these were years
of depression*

1929

1930

1931

1932

1933

1934

1935

OF PROGRESS

indicating the trend toward modern wiring protection with

ELECTRUNITE REG. U. S. PATENT OFFICE Steeltubes

You are an electrical contractor. You are continually looking for new jobs. You want those jobs to pay you a profit. To do that you must keep abreast of the times in new materials and better methods.

Seven years ago, Electrunit Steeltubes, the original rigid threadless electrical metallic tubing, made by Steel and Tubes, Inc., patented electrical resistance welding process, was first introduced as a safer, more economical protection for wiring. Its adoption throughout the country by owners, architects, engineers and contractors has been more than satisfying. Today, more than 100,000,000 feet of Electrunit Steeltubes are in service—affording adequate mechanical and electrical protection to wiring in many thousands of buildings.

Your future profits depend on your ability to recognize trends—and the trend in wiring protection is definitely toward Electrunit Steeltubes. Let us tell you how it will reduce your costs, give you greater profits and help you do a better job of wiring. Write Department E. C. for complete information or specify "only genuine Electrunit Steeltubes as made by Steel and Tubes, Inc.," on the next order you send to your supply house. It costs no more to buy the genuine original Steeltubes than it does to buy other brands.

Electrical Division

Steel and Tubes Inc.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING
CLEVELAND . . . OHIO



Electrical Contracting, January 1936



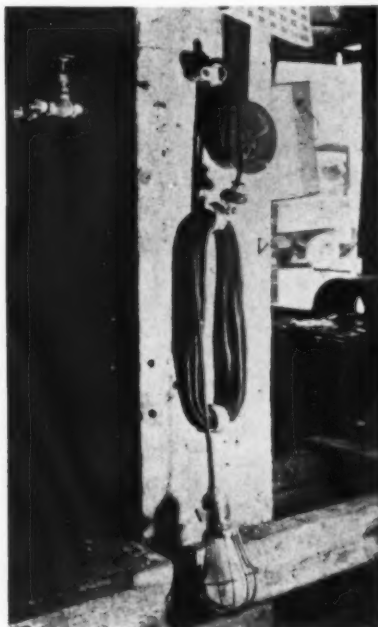
Service Shop . . . Practice

Temporary Ovens for Water-Soaked Motors

Severe floods in and around Elmira, N. Y., placed such a heavy demand upon oven equipment that the United Electric & Speedometer Corporation of that city built an inexpensive temporary oven which took care of this heavy rush business satisfactorily. It was set up in a concreted court which adjoins the shop, using wooden frame-work and transite sheets or panels. Temporary gas burners with hose connections were used, an average temperature of 325 deg. F. resulting. This oven was made 8 ft. square and 4 ft. high, and was said to have housed thirty-six motors at one baking operation.

Extension Cord Rack

The abuses to which loose extension cords are subjected in motor repair shops caused the Roland Electrical Company, Baltimore, Md., to provide a simple method for coiling



these cords on columns near their wall receptacles. Two 1½-in. half-straps were nailed to the column below each receptacle. The plug end of the extension cord was secured to the column with a porcelain cleat so that the remainder of the extension may be coiled around the open-end pipestraps when not in use. With this method the extensions may be found by their receptacle outlets. It also cuts down the amount of cord abuse which would occur if left upon the floor to accumulate oil and to be run over with heavy dollies and trucks.

Transfer Spools for Magnet Wire

Factory spools and reels of magnet wire are rewound upon aluminum stock transfer spools in the service shop of Young and Maue, Jersey



City, N. J. It is thus possible to limit the investment in factory spools on hand. By dividing larger reels of wire upon several transfer spools, the winding of coils that require three- or four-in-hand can be done with a minimum amount of wire stock. The smaller and more

uniform size of these spools is considered an advantage in handling.

About sixty of these aluminum spools were obtained for their junk value, when a neighboring weaving plant changed its methods. These spools, which will hold over 20 lbs. of wire, are 8½ in. overall diameter, 4 in. wide, and have a 3½-in. deep web. They are used for magnet wire ranging from No. 9 to No. 19. An oak rack 6 ft. high and 5 ft. wide, with ¾-in. spool supporting pins is used to store the active spools.

Portable Under-Cutter Stand

A substantial floor stand and ring-type motor suspension bracket was made by Berger Bros. Electric Motors, Inc., Rochester, N. Y., for its flexible shaft commutator undercutting outfit. A heavy cast iron base, a telescoping adjustable pipe stand fitted with a band-iron hanger



bracket at the top, and a small roller cradle for suspending the motor drive completes the outfit. This stand can be set at the desired position adjoining an armature, and as the cutter is moved back and forth along the commutator slots the motor is free to pivot and roll back and forth on its roller-cradle in accordance with the slot travel that the job entails. Because this outfit is portable, it may be used at any location in the shop, or it may also be taken out on important jobs. This tool can be set up quickly, and allows

CONTRACTORS!
Use the Improved

DELTABESTON MAGNET WIRE

with *Purified Asbestos* Insulation

Purified Asbestos

FEATURES:

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Contractors! Deltabeston offers you an *improved* Magnet Wire which assures more durable and satisfactory installations.

General Electric's Deltabeston research engineers have *purified* asbestos by a special process so that its electrical properties are considerably better than those of any commercial asbestos available! The exclusive new process gives an asbestos insulation with far greater dielectric strength and higher resistance to heat and abrasion.

Another feature is the *bonding* of the *purified* asbestos to the copper and the application of a Glyptal varnish finish. This treatment produces a tougher, yet more elastic insulation. It permits a shorter radius of bend without cracking.

Be sure to obtain complete information and samples of this superior Deltabeston Magnet Wire which will provide greater protection and service than any magnet wire heretofore available. See your nearest G-E Appliance and Merchandise Distributor, or use the coupon below.

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SMOOTH
AS A
GUN BARREL



SIMPLE

Here the two parts of a Jefferson-Union fuse—casing and fusible link—are shown. The casing is the part that is cleaned and the fusible link is the part that melts in a fire.



FAILING to clean thoroughly the casing of a renewable fuse shortens its useful life. Point out to prospects that imperfect cleaning costs many extra casings — that a casing which is easily, thoroughly cleaned is far more apt to be cleaned.

There are no obstructions to cleaning in a Jefferson-Union casing. The volatilized metal can be removed — easily, quickly. The fibre used is the strongest and toughest that long experience has found. And the fusible link is designed to reduce the amount of metal volatilized to a minimum. Misaligned or twisted fusible elements — another cause of ruined fuses — are avoided with Jefferson-Union Fuses. They cannot be assembled wrong. Many renewals, minimum yearly fuse costs are assured by Jefferson-Union Renewable Fuses.

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Renewable FUSES

ALIGNED
AUTOMATICALLY



Cannot be assembled wrong. Fuses are made of high-grade metal. The metal is in one piece and is not twisted. Fuses are made of one piece and are not twisted. Fuses are made of one piece and are not twisted.



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When your stock record reads: "50 brushes for 1/4 H. P. Model X Blank Motor" . . . you're sure of the 50 but are you sure they meet the service conditions for which that motor was built?



Low specific resistance to give high torque combined with sufficient contact resistance to give good commutation is a necessary brush characteristic of the series A. C. motors used in food and drink mixers. Good commutation helps prevent excessive temperature rise.

The torque and commutating characteristics mentioned above must also be present and remain constant in the brushes for the repulsion-start motors found in refrigeration service. These brushes must stand the shocks of frequent starting and be absolutely noiseless.



Fan motor brushes must each season remove the dust and lint of winter storage from the commutator without wearing it. Tolerances on sizes must be close so the brushes won't bind in dirty holders.

One make of washing machine motor using ring brushes probably outranks all others in number of applications. Its brushes must lubricate without "gumming" and withstand the vibration and end-thrust of the driven mechanism.



The flush mica commutators of portable tool motors require carbon brushes with sufficient cleaning action to prevent "high mica" without commutator wear.

The high contact resistance resulting from glazed commutators has an adverse effect on the suction value of vacuum cleaners. It is the job of the carbon brushes to prevent any glaze from forming.



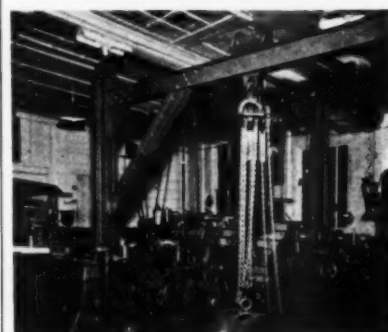
Avoid "2 Faced" Inventories by Sending for Ohio Catalog 19B and the 64 Page Booklet "The Brush Phase of Motor Maintenance." They're both free!

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a traveling hoist. A length of shafting is fitted against the press ram and the motor shaft, to serve as a mandrel, and the pressure actually pushes the suspended motor away from the blocked pulley or pinion. The pulley-holding rigging is held by four heavy chains and 1 1/2-in. round threaded chain take-up bolts, which have 24-in. long threads. As the ram pressure pushes the steel shafting into a pulley or pinion, the entire rigging and four taut chains hold the pulley in place, while the suspended motor is free to push away.

Swivel Boom for Compact Shop

A 14-ft. revolving boom and 1/2-ton track type chain hoist was installed at a central point in the service shop of the Eifer Electric Company, Union City, N. J. It can easily be swung toward the lathes, winding benches or loading dock in handling heavy equipment. It was made of heavy structural steel channels and



anchored to pivot freely. This shaft is fastened at the floor and ceiling, and has a stop-collar bearing which holds this boom above the floor. By providing this hoisting arrangement, it is possible to get along without an overhead trolley or traveling crane.

Annual Budget for Oven Usage

The annual cost of operating its bake oven for the preceding year is applied by the French-Gerleman Electric Company, St. Louis, Mo., against the total cost of all motor repairs that involved oven usage. This provides the basis for an average charge which may be prorated during the succeeding year on all oven-use jobs. Thus the oven's operating cost is taken out of general operating cost and is budgeted toward the specific work where this cost originates.

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TAPE**

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It Holds
It Lasts**

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RUBBER CO.
CAMBRIDGE, MASS.**





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A Profitable Partner for Every Contractor in 1936

Check up on your progress!

IT IS as important to forget some things as it is to remember others! Let's forget the headaches and mistakes of the past and remember that the very essence of business is the expectation of a profit on the part of those who conduct it.

It's time to get back to fundamentals, to common-sense truths from which we should never have strayed! Let's revive the quaint custom of working to make a profit, not merely to make sales.

Don't fool yourself! Many Contractors seem to think that by increasing their volume they automatically add to their profits. In planning for the future you cannot place too much dependence upon increased volume as the sole producer of profits. Growth is essential to any business, but those who have come safely through the years have learned that the true measure of success is not size, but progress—progress not necessarily in volume but in PROFITS.

PROTECT YOUR PROFITS—Every Contractor has general information on prices, but when you come to billing materials you naturally want *concrete, specific* information on what to charge and why.

TODAY—as you read this, hundreds of successful Contractors and Dealers of every size rely upon the **NATIONAL RESALE PRICE SERVICE** as their first assistant for just such definite price information—a partner who will work every hour of the day without complaint, helping you to build a more profitable business.

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Code Chats.....

Questions and answers relating to the interpretation of the National Electrical Code...

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Armored Cable in Pipe Shaft

Is there any Code ruling against installing armored cable in a pipe shaft?

The regular rules for armored cable apply providing normal temperatures (not over 120 deg. F.) and dry atmospheres are present.

Of course, armored cable must not be run in proximity to steam pipes nor where it will be subjected to moisture from sweating or dripping pipes. Also, it must be suitably supported.

Grounding Cable Runs

Is 2-wire and 3-wire armored cable on 220-volt single phase and 3 phase circuits respectively, considered properly grounded, if the ground connection is made continuous to the cable by the use of the armored cable connectors made up tight to the iron box?

Yes, providing a place on the cable system (generally the meter cabinet or cut-out cabinet) has been grounded in accordance to the requirements of Sections 907, 908 and 909. Then armored cable connectors made up tight are considered satisfactory to carry the grounding through the cable system except where the voltage is in excess of 150 volts to ground. This is covered in rules 904-c and d.

Mogul Sockets on No. 14 Wire

Are mogul socket fixtures allowed on a regular 15-amp. No. 14 wire lighting circuit?

While the Code seems to imply that mogul sockets should be used only on circuits having wires of No. 12 or larger, there is no provision in the 15-amp. branch circuit rule (2005 in the 1933 Code and 2004 in

the 1935 Code) that says that a mogul socket shall not be placed on such a circuit.

While, as stated above, rule 2008 implies that mogul sockets should be on the heavier wire, in view of the lack of prohibition, it would be hard to justify a violation against the use of one or two 300-watt lamps on a No. 14 wire circuit.

Sealing Explosion-proof Work

In using explosion-proof fittings can a junction box be filled with sealing compound or must a sealing fitting be used?

This is covered in rule 3203-c, which requires sealing at any point where conduit terminates in an enclosure where arcing or sparking is



ADVOCATES KNOWLEDGE OF JOB SCHEDULES: Long a successful contractor and dealer in Syracuse, N. Y., L. W. Kiese-wetter values the smaller commercial accounts for their quick completion. Several downtown store remodeling jobs which Mr. Kiese-wetter has recently completed were more profitable than larger public buildings that his company is wiring. As business begins to speed up, he predicts a change in competitive thinking that will cause the bids for long drawn-out types of work to be raised in line with these higher carrying costs. Mr. Kiese-wetter is active in local association affairs and a member of the executive committee of the New York State Association of Electrical Contractors.

likely to occur and wherever conduit leads from a hazardous to a non-hazardous area. If a junction box is present at such a point the above rule would permit sealing by means of filling the fitting with compound provided sufficient compound was also run into the ends of the conduits to form a plug at least $\frac{1}{8}$ in. thick. When this latter is done there may be no need for further filling the box.

It is assumed, of course, that all the boxes and fittings used are those which have been approved for use in hazardous locations.

The filling of boxes with compound has been used at times in boxes not intended for use in hazardous locations but this was only as a makeshift arrangement to endeavor to get some degree of explosion-proofness with existing equipment and is not to be recommended wherever possible to change the fittings.

Protection for Dual Rated Motors

We have lately received inquiry concerning motor wiring protection for 220-volt, 3-phase unit heater motors equipped with two windings. These windings are for separate speeds, one is rated $\frac{1}{2}$ -h.p. and the other 2-h.p.

Should each set of these leads be protected as called for in Section 808, Table 1, or would one set of thermal cut-outs of a rating called for to protect the larger or 2-h.p. winding be sufficient?

It has been pointed out as a parallel case that the latter method is used in case of D.C. compound wound motors where one set of over-current protective devices is used to protect the motor windings including, of course, the shunt winding.

Rule 808-c reads, "Motor-running protective devices * * * shall be required for each motor to protect the motor and motor branch-circuit conductors against normal operating current overloads," and then goes on to give the maximum values for these protective devices.

It is quite obvious that where there is a large divergence in the two ratings of a motor the protective device selected to give protection to the higher horse-power windings of the motor will not give the proper protection to the lower horse-power winding. Furthermore, the proper protective device for the lower horse-power rating would not allow sufficient current for the proper operating of the higher horse-power





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Entire switch and operating mechanism can be removed for wiring.

A heavy duty Industrial Safety Switch—Very Compact (fuse block over switch)—Dead Front—Positive Quick Make and Quick Break—Interlocking—Straight thru wiring—Double Break—Breaks full rated load—High Interrupting Capacity—all switch parts cadmium plated—especially suitable for mounting on machines—furnished also in Cast Iron Boxes—water and dust tight—See catalog pages 23, 24, 25.

Rated H.P. 230 to 575 Volts A.C. 30-60 Amps. 2, 3 and 4 pole.

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ANNOUNCES
A NEW,
PRACTICAL AND
ARTISTIC
POST-TOP
REFLECTOR

City parks and playgrounds, suburban street-lighting and gasoline service stations are among the principal prospects for this new type of lighting.

The unit consists of a porcelain enameled reflector attached to an urn shaped cast aluminum socket housing by means of heavy cadmium plated iron rods. The cast housing fits over two inch pipe and is secured by set screws.

Green porcelain enamel, white inside, is standard finish but reflectors will be furnished in red, blue and other colors on special order. Three sizes of reflectors 18", 20" and 24" to accommodate lamps from 200 watt to 1500 watt capacity.

Standard package is one complete unit in a shipping carton.

Write for additional information, prices and light distribution chart.

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Electrical Contractor who can save
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products.

For a complete line of conduit fittings adopt Steel City as a standard. Quality, workmanship and performance on the job resulting in a quick and neat installation will save you time and money and result in repeat business.

Original Fullman Floor Outlets Adjustable and Non-Adjustable	Nipples—Adapters—Reducers —Enlargers
Nozzles and other Accessories	Universal Couplings—Pipe Straps
Universal Insulator Supports	Hickey Hangers—Fixture Studs
Allen Benders—Light & Heavy	Ground Fittings—Complete Line
Wall Conduit	Outlet Boxes and Covers—All Types
Superior Fish Wire and Pullers	Switch Boxes—All Types
Campbell Receptacles and Plugs	Set-up Boxes—All Types
Marchand Clamps and Accessories	Bar Hangers—All Types
Connectors—All Types	Cast Iron Boxes—Round and Square
Entrance Fittings—All Types	
Locknuts and Bushings	

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STEEL CITY ELECTRIC COMPANY
PITTSBURGH PENNA.

rating. Therefore, each winding should have its own proper protection in accordance with the motor tables.

A compound wound motor is not quite a parallel case.

It just so happens in the example cited above that according to Exception 1 of 808-c, both windings are considered as being sufficiently protected by the motor branch circuit protective device as 15-amp. devices are the minimum size required except for automatically started motors of $\frac{1}{4}$ to 1-h.p. which are not provided with inherent overheating protection.

Fatal Current Values

In accordance with a promise made in these columns in the December issue, the editor of this column has contacted Dr. William B. Kouwenhoven of Johns Hopkins University, eminent authority on the effects of electrical currents on persons, and he reports as follows,

I do not see how a man can carry 150 milli-amp. from his hands to his feet without being seriously injured, if not fatally so. My reason for this statement lies in three cases that have come to my attention. In two of these cases the victims received a maximum current of 110 milli-amp. flowing from the right hand to the feet. Both of these men failed to respond to artificial respiration and died. In the other case there was a man who received 76 milli-amp. from hand to hand. He was badly burned and could not release his hold on the circuit. Another man cleared the circuit and saved him. I am familiar with the details of these three cases and actually measured the current that flowed in the last case mentioned above.

This report is sufficient to show that a current of 76 milli-amp. is exceedingly dangerous and, therefore, any source of current capable of delivering that volume, and having a voltage sufficient to break down the resistance of the human body, certainly would not be safe enough to play with.

Of course, the amount of current that will flow through the body depends upon many factors pertaining at the time of contact. First, there is the matter of the dryness of the skin, the tightness of the contact of the electrode with the body, and many other conditions.

This column, therefore, advises all to keep away from currents which have sufficient voltage in back of them to break down this body resistance.

Possibly certain individuals who

ARROW

RADIO OUTLET

No. 2145

THIS NEAT HOOK-UP for radio connections provides Aerial, Ground and Power connections from a ONE-gang Outlet. . . Fits all standard-depth wall boxes; takes standard Bakelite Duplex Receptacle Plates. ALL Bakelite:—face, body and back. . .

Aerial, ground and power connections are plainly marked on Receptacle. To further ensure correct connections, the aerial and ground plug has blades set at angle which prevents insertion in power slots of Receptacle. In use it is positively fool-proof. . .



Standard plug cap furnished on radio fits the power slots only. Firm, positive contacts replace the loose fit of ordinary radio-plug connections. A divider plate keeps aerial-ground and power circuits separated in wall box.

with Plug
Complete
No. 2145

Aerial-Ground-Power from a 1-Gang Outlet

This Radio Outlet serves equally well for old buildings or new work. As easily installed as any Convenience Outlet; gets rid of straggling surface wires. Takes a standard wall box and standard Bakelite plate. Should be planned as part of the newer-standard wiring job, completing the scheme of modern electrical convenience.

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Actual Size
5/8" Thick

MCGILL

THIN MODEL

Levoller

No. 41

6 Amp.

The Levoller Thin model Switch No. 41 is an achievement in small switches. The above actual size picture shows it is not over 5/8 of an inch in thickness. In spite of its smallness, it retains all of the practical characteristics of the famous Levoller line. It is the smallest 6 amp. switch made.

At the left are shown six logical uses for this practical Levoller, which may be secured in three different stem lengths. You'll make no mistake in ordering these Levoller Thin Model Switches.

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 Pull Switch
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used our original "Chat" appearing in the August issue, to justify their running charged wires around farm yards to keep animals enclosed within limited area, will revise some of their claims which may have been based on that original "Chat."

Beauty Parlor Wiring

One of our local boys just wired up a room in a new beauty parlor. He has a 60-amp., 3-wire, 110-220 volt service. On this service he has wired seven twin, 15-amp. receptacles, to each of which receptacles is run No. 12 wire. Connected to each receptacle are two 10-amp. dryers. These circuits are protected with 20-amp. fuses. While it is said that there is no likelihood of every dryer being on at the same time, if this place is busy all dryers certainly will be used. That would mean a 140-amp. load. As this could not be classified as a heavy duty appliance circuit, should not a No. 10 wire be the smallest allowed, otherwise the circuit would have to be protected by 15 ampere fuses?

There being only appliances installed on these circuits the circuits may be classed as appliance branch circuits and the rules of 2006 apply.

The receptacles are to be of 15-amp. capacity and the wires must be not smaller than No. 12. If No. 12 wire is used the fuses must not exceed 20 amp. The wires, however, could be No. 10 or larger, but the circuit fuses could not exceed 25 amp. as there are seven duplex receptacles, each duplex receptacle having two 10-amp. dryers, there would be a load of 80 amp. on one side and 60 amp. on the other side of the 110-220 volt service. This, therefore, would require, for these dryers alone a feeder of three No. 3 wires. If there is other load on the feeder, then additional capacity would be required in the feeder.

Use of Flexible Tubing on Outline Lighting

Where would flexible tubing (3805-c) be apt to be used in outline wiring? I should think that when the receptacles are close together it would not be required, but when over 2 ft. apart a cleat would be used.

The flexible tubing mentioned in this rule would be used for the mechanical protection of the open wires. This might be where the wires have to bend around a piece of angle iron or other parts of the sign structure.

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ELECTRICAL CONTRACTING

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The Buyers Reference Number, published as Part II of **ELECTRICAL CONTRACTING** for December 1935, is substantially bound as a separate book for use during 1936.

Tabulated Buying Data

Exhibit Section

Lists of Sales Offices,
Locations of Warehouses

Company Name and Trade Name Index

Company Names and Trade Names listed in the Classified
Directory Section arranged alphabetically

Directory of Manufacturers Classified

With Company Names, Addresses and Trade Names

ELECTRICAL CONTRACTING

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**DECEMBER
1935
PART II**



ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

Peace

MEN of ability instinctively trust each other personally, but put them in an impersonal situation, such as an association, and mistrust arises. In the electrical industry association jealousies and rivalries compounded with fear have brought about a lack of respect and trust of one branch of the industry for another. With such a condition it has been impossible to harness the industry as a team that would pull the load together.

The call for peace, however, has been sounded. The leaders in the national associations of electrical manufacturers, wholesalers and power companies sat down to dinner early in December as guests of the National Electrical Contractors Association, and listened to a simple appeal by President Peak for mutual confidence and respect—for peace and prosperity. Out of this meeting came a new vision to these leaders in the electrical industry, a new encouragement, a new belief that the industry could work together to the advantage of all. A joint planning committee is being set up, which will meet early in January.

No man, no company, no association, no branch of an industry, is sufficient unto itself. When any unit attempts to make a profit at the expense of an associate, the sum total is a loss for all. We need peace in this electrical industry, and with it will come an understanding of the true relationships, an appreciation of each other's capacities, a feeling of the power that comes from united effort.

This joint planning by the industry for progress through team-work offers great promise. If its mind is filled with the thought of peace and progress, and if jealousies are completely banished, it will herald a new era of prosperity for the entire electrical industry.

1936

AGAIN the electrical construction business is on the upgrade, and the picture for the new year is definitely one of improvement. The trends established in 1935 as shown on page 6 of this issue, are the best guides available to show the probable course of 1936 electrical construction business.

The k.w.-hr. output is considerably ahead of the 1929 peak, and apparently increasing at the pre-depression rate. The number of new consumers is mounting again at the normal rate. That the power companies believe these increases will continue is shown by the sharp up-turn in expenditures for additions and extensions and an even larger appropriation for 1936.

Heavy appliance sales, such as ranges and refrigerators, which mean additional wiring, are sweeping ahead at a dizzy pace, with 1936 budgets set for even greater outputs.

Of construction itself the charts show how closely is the business of the electrical industry linked with new building projects. If one were to superimpose the chart for output of electrical manufacturers, and the one for power company expenditures for line and plant additions and extensions upon the chart of estimated construction totals, it would probably be found that the curves were almost identical.

Construction, in other words, at least so far as the electrical industry is concerned, is basic. It is improving, and now that it is becoming increasingly evident to government, business and finance that no lasting recovery from the depression can be expected until new construction begins to go forward at a greatly accelerated pace, we can expect a sharper upturn in volume.

There is, however, another side to the 1936 economic picture that is even more encouraging to the electrical contractor, and that is an increasing tendency on the part of the electrical industry to promote markets. The charts mentioned are painful reminders of what happens to an industry that depends so much for business upon new construction.

NEMA, for long devoting its attention largely to standards, is now for the first time definitely engaging in a study of market development. Public utilities, as a result of lower rates and the rather general introduction of promotional rates, are striving to make up the loss in revenue by selling a greater use of service which means new services. Cooperative campaigns such as Better Light—Better Sight and the National Kitchen

Modernizing Campaign, and perhaps others of even greater importance to the electrical contractor, will provide a handsome increase in the volume of wiring before the year is over.

A growing appreciation of the mutual interdependence of the major branches of the industry, both nationally and locally, is becoming more evident, and should bring about better conditions for the contractor. The attention being given to public education on electrical safety is already resulting in a reduction of bootlegging of wiring and in more reinspection. The local electrical league movement, once more on the increase, will result in more local promotional effort.

In general, the whole commercial tone of the electrical industry is healthier today than it has been for years. The industry is for the first time in its history becoming sales promotion minded. With the volume of work to be done through industrial and commercial modernization, home re-wiring, correction of defective wiring through reinspection, wiring for new services, better light, etc.,—all possible through cooperative selling—the electrical industry can make itself independent of the vagaries of new construction.

Home Safety Dividends

SAFETY in the home is due to receive increasing attention. The president, powerful social and educational organizations as well as insurance companies are beginning to bend their efforts to reducing the number of accidents in homes.

Even now the public interest is aroused. A glance at the article on "Public Interest in Electrical Safety" in this issue is evidence of the possibilities of arousing the public in this direction.

Two of the causes for home hazards are poor and inadequate lighting and defective, poorly installed, misused and inadequate wiring. Both of these conditions can be materially improved to the advantage not only of the public, but of the electrical industry as well.

The unusually fine reception that the educational work in electrical safety under the auspices of the International Association of Electrical Inspectors has received to date has been accomplished at a very small expenditure of money. A more widespread financial sponsorship of this work with a slight increase of available funds, should pay the electrical industry enormous dividends.

Labor Suit

THE suit against New York Local No. 3 by N.E.M.A., charging that the union has built a wall around the Metropolitan area and will not permit the installation of non-union made and wired material, is very important to all union contractors.

Has a local union the right to interfere with the free flow of goods in interstate commerce? Has a union the right to dictate to a contractor what material he shall or shall not use? Has a union the right to demand that material be knocked down on the job and rewired by union members? In other words, has labor any legal rights in its contractual relations with employers beyond wages, hours and working conditions?

It is to be hoped that the court's decision in this case will supply directly or indirectly an answer to these problems, because any restraining influence on the free flow of standard electrical goods is injurious to the contractor. Limitation of selection is bound to be reflected in a quality that does not permit the contractor to get right efficiency or to give his customer the best results for the job.

Moreover, restraining influences of this kind, if permitted, serve to further restrict the field of operations of union contractors. Organized labor cannot expect employers to be successful in enlarging the market for the employment of union wiremen when they build up economic barriers that alienate prospective customers.

Westinghouse

THIS year Westinghouse is celebrating its first fifty years of electrical manufacturing. Starting in 1885 as a pioneer in a pioneering industry, it has always maintained an engineering development perspective.

While the company has been responsible for a great many important contributions to the advancement of the electrical art, the great thing that the name Westinghouse will always stand for is the introduction of commercial alternating current service. Among its pioneer achievements in this connection are the first transformer in 1885, the first a.c. generating station in 1886, the first a.c. induction motor in 1888.

The industry will take pleasure in congratulating Westinghouse on its fiftieth anniversary, and in wishing it another half century of achievement.

N.E.C.A. News..

Material for this department is supplied
by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

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Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

Executive Committee Meets

The Executive Committee of the Association held a four-day meeting at the national headquarters in New York City on December 11 to 14 inclusive. There were present also the chairmen of the Committee on Distribution, Committee on Highway Crossings Signals and National Motor Section of the N.E.C.A.

Important matters of industry and Association policy were acted upon and plans outlined for the year 1936 including the appointment of chairmen of the various standing committees for the coming year. Each of these standing committees will be increased in personnel through the selection by their chairmen of members from all parts of the country.

Chapters and Chapter Membership

Pursuant to the authority given to the Executive Committee under the By-Laws action was taken amending Article XIII of the By-Laws to clarify and strengthen the provisions governing chapters and chapter membership. These amendments of the By-Laws provide for the following important provisions:

1. Individual national membership shall not be granted within the jurisdiction of any chapter or chapters without the approval of such chapters.
2. Where one or more chapters exist in any locality, and a group of contractors, not members of such chapters, make application for membership and a separate additional charter as a chapter, the Executive Committee shall make an investigation as to the justification for such additional chapter and may in its discretion grant membership and charter to such applicants.
3. Any member withdrawing from a chapter, either by resignation or expulsion, shall cease to be a member of the National Association unless waiver is granted by the chapter, but such individual may appeal to the Executive Committee for investigation of the causes for such withdrawal as affect-

ing the forfeiture of his national membership, and the Executive Committee shall take such action as in the judgment of the committee is necessary.

N.E.C.A. Committee Appointments

Joint Industry Development Committee: E. N. Peak, R. M. Walker, Robt. W. McChesney.

National Electrical Code Committee: Allan Coggeshall, George Andrae, Theo. H. Joseph, E. N. Peak.

Cost Data Committee: G. W. Patterson, chairman.

Legislative Committee: Robt. W. McChesney, chairman.

Publications Committee: R. J. Nickles, chairman.

Constitution & By-Laws Committee: D. B. Clayton, chairman.

Joint Committee with I.A.E.I.: Louis Kalischer, chairman.

Distribution Committee: R. M. Walker, chairman.

National Motor Section: J. R. Stolzenbach, chairman.

Highway Crossings Signals Committee: J. W. Collins, chairman.

Simplified Business Record

Announcement was made by General Manager Davis that the N.E.C.A. staff have developed a new Simplified Business Record system for the smaller concerns in the electrical contractor-dealer business who do not need as extensive a record as the Standard Accounting System of the Association. This Simplified Business Record is so simple as to be easily understood and kept up by the one-man contractor without training in accounting methods and yet will provide all of the accounting needs for such small and medium sized businesses with a full analysis of their operations as contractors and dealers. It is so compact that it consists of but one book with all of the data before the contractor on a double-page spread.

It was decided by the Executive Committee that one complete set be

given as a part of the membership service to every new applicant for membership who requests the same, and that all of the old members be advised that such complete set of this new system will also be available to them without cost upon their request. As soon as they can be prepared sample sheets of the system will be sent to all members so that they may examine the same before asking for one of the books. Full description of the new Business Record will be published in the February issue of ELECTRICAL CONTRACTING.

Joint Industry Conference

An outstanding feature of this meeting of the Executive Committee was an Electrical Industry Conference Dinner held on December 12, at which major executives representative of the four national associations of the industry were present at the invitation of President Peak and as guests of the N.E.C.A.

In addition to the members of the Executive Committee the industry representatives at this conference were:

National Electrical Manufacturers Association:

F. C. Jones, president, N.E.M.A., president, Okonite Co., New York City.

S. L. Nicholson, assistant to vice-president, Westinghouse Elec. & Mfg. Co., New York.

Robert Edwards, president, Edwards & Co., New York City.

C. E. Swartzbaugh, president, Swartzbaugh Mfg. Co., Toledo, Ohio.

W. E. Sprackling, vice president, Anacanda Wire & Cable Co., New York City.

T. S. Barton, district engineer, General Electric Co., New York City.

L. F. Adams, engineer, General Electric Co., Schenectady, N. Y.

W. J. Donald, managing director, N.E.M.A., New York City.

National Electrical Wholesalers Association:

F. R. Eiseman, chairman, N.E.W.A., president, Revere Electric Co., Chicago, Ill.

J. L. Buchanan, chairman, General Electric Supply Corp., New York City.

E. W. Clark, vice president, Westinghouse Electric Supply Corp., New York City.

G. E. Cullinan, vice president, Graybar Electric Co., New York City.

B. T. Hare, sales manager, Rumsey Electric Co., Philadelphia, Pa.

W. J. Kranzer, president, Crannell, Nugent & Kranzer, New York City.

E. Donald Tolles, managing director, N.E.W.A., New York City.

Edison Electric Institute:

A. H. Kehoe, vice president, E.E.I., vice president, New York Edison Co., New York.

W. S. Finley, president, West Penn Electric Co., Pittsburgh, Pa.

H. F. Smiddy, representing W. H. Burke, vice president, Ebasco Services, Inc., New York City.

H. S. Bennion, assistant managing director, E.E.I., New York City.

C. E. Greenwood, commercial director, E.E.I., New York City.

The keynote of the Industry Conference was established by the opening address of President Peak of the N.E.C.A. whose statement appears in another part of this magazine. Mr. Peak emphasized the necessity for a greater degree of industry confidence and understanding between the several groups of the industry in order that progress may be made not only in the correction of differences that may

A Message to Contractors Who are Price and Quality Conscious

Hear ye — Hear ye — Contractors who demand absolute dependability and accuracy in the equipment they supply. Sangamo Time-Switches are made to supply that demand. They're built in a factory where precision is a tradition of 30 years' standing, where quality and reliability are built into every instrument by expert craftsmen familiar with every phase of time-switch manufacture, and are sold at a price that forbids consideration of inferior merchandise.

It pays to use Sangamo Quality and Dependability.

Form VW and VS — VW (electrically wound) and VS (synchronous motor) switches, moderately priced, dependable. Any commercial frequency. Omitting Device. Manual operation without disturbing sequence.



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- ★ Ferrule Type permit speedy renewal . . . plenty of room to insert link in fuse case . . . Ferrules have deep screw driver slots.
- ★ After blowing, fragments of link can be quickly, easily removed.
- ★ Links are of uniform thickness . . . can be inserted from either end of fuse case.
- ★ Knife Blade Type have no small parts to become lost or mislaid in refilling . . . simple and efficient in design.
- ★ Permanent rigid blade alignment . . . Blades are assembled to an extra heavy insulating crossbar.
- ★ Can be assembled ONLY one way . . . the correct way.

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exist between the groups, but even of more importance in a united approach to the greater possibilities for business opportunities in the future.

Mr. Peak was followed by talks from F. C. Jones, president, National Electrical Manufacturers Association, A. H. Kehoe, vice-president, Edison Electric Institute, F. R. Eiseman, chairman, National Electrical Wholesalers Association, G. E. Cullinan, S. L. Nicholson, Louis Kalischer, C. E. Swartzbaugh and others.

In summing up at the close of the conference, Mr. Swartzbaugh, chairman of the NEMA Business Development Committee recommended that a continuing committee for industry development be set up by the conference in order to carry forward the purposes of the conference. By unanimous action the presidents of the four national associations were appointed to establish such a permanent Industry Development Committee and following the conference these men met and decided that the permanent committee should be composed of three representatives from each association and that the first meeting of the committee be held at the call of President Peak early in January.

National Dues in Installments

Amendment was also made to the provisions of the By-Laws governing payment of national dues to provide that the annual dues of \$15.00 of both present members and applicants for new membership may be paid in three installments of \$5.00 each, the first installment to be paid upon the due date or submitted with the application and to be accompanied by two notes for \$5.00 each payable in four months and eight months from that date respectively. Both notices of dues and application blanks will carry the forms for these partial payment notes and such notes must be submitted with the first payment by each member desiring to pay his annual dues in three installments.

National Kitchen Modernizing Bureau

The N.E.C.A. has accepted an invitation to cooperate through a national industry committee in a home modernization program to be known as National Kitchen Modernizing Bureau. This program is designed to follow the successful plan of promotion carried out by the Electric Refrigeration Bureau.

The purpose will be to direct public thought to the need of modernization in the home workshop and the contributions that can be made to easier living through the installation of all electric equipment.

The National Kitchen Modernizing Bureau is designed to coordinate industry action into a sustained promotional

program and money has already been subscribed covering the first year of activity.

L. W. Davis, general manager, N.E.C.A., has been appointed to serve as a member on the bureau.

Organization Drive Planned

Plans have been formulated for an intensive drive for National membership and, in accordance with the plans of the Committee on Distribution, the organizing of local and state associations affiliated with the N.E.C.A. during the next three months. This organization program will be under the direction of the executive committee-man in each Division. State and local leaders will be selected to put the program into effect simultaneously in every section of the country.

Next Meeting Executive Committee

Plans were tentatively set for holding the next meeting of the Executive Committee in St. Louis, Mo., early in April.

President Peak Plans Western Trip

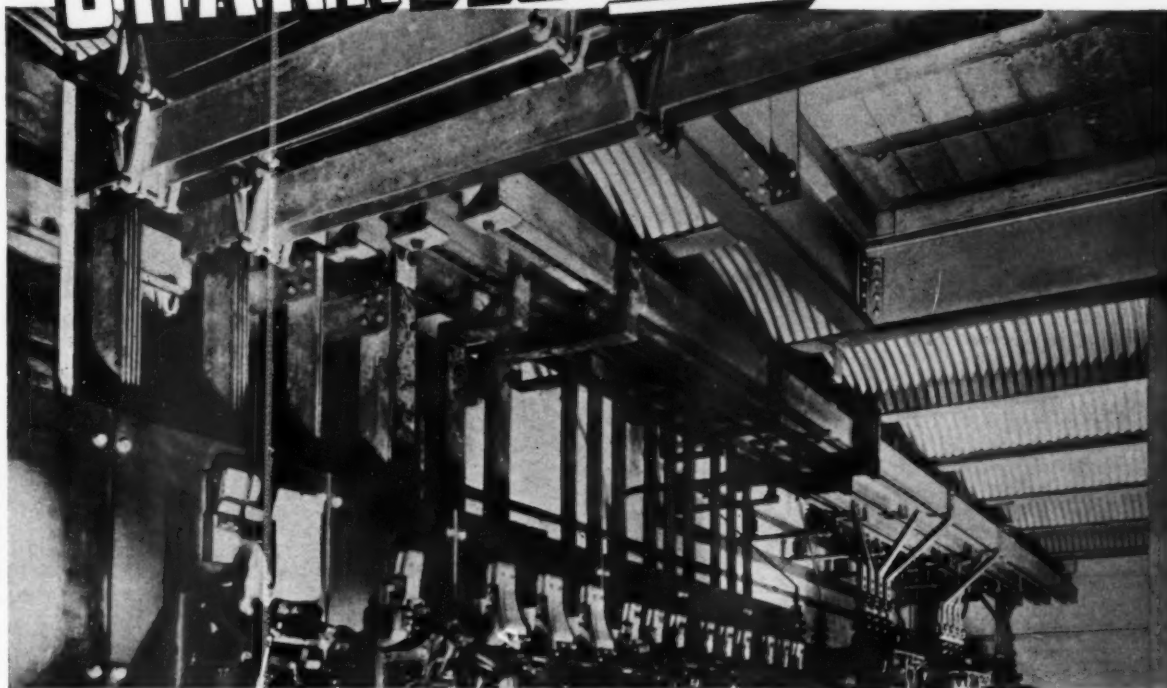
President Peak announced that he is planning a six-weeks trip, starting about February 1, to cover a large part of the country west of the Mississippi River. He plans to visit the following cities: Kansas City, Mo.; Tulsa and Oklahoma City, Okla.; Fort Worth, Dallas, Houston, San Antonio and El Paso, Texas; Phoenix, Ariz.; San Diego, Los Angeles, Santa Barbara, Fresno, San Francisco and the Bay Area, Cal.; Portland, Ore.; Seattle and Spokane, Wash.; Boise and Twin Falls, Idaho; Salt Lake City, Utah; Denver, Colo.; and Omaha, Neb.

Detailed information regarding Mr. Peak's itinerary will be sent to each of these cities as soon as definite dates can be arranged.

Pledge of Cooperation

One of the important actions taken by the Executive Committee was the proposal for a form of "Pledge of Cooperation" to be made a requirement for membership in the N.E.C.A., as evidence of the responsibility of N.E.C.A. members to the public and as a basis for determination of their qualifications as fulfilling the functions of the electrical contractor and dealer. The adoption of this "Pledge of Cooperation," which will be found on page 8 of this issue, is to be referred to the membership of the Association for mail ballot.

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All these shapes are easy to form, light to handle. Joints between similar shapes, or between dissimilar shapes, are easily and quickly made by bolting or by welding. Either method is economical, and permanently efficient. Suitable fittings are available for all shapes.

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Contracting

News

Rewiring Market to Be Studied

The first step in the development of the market for rewiring already wired premises was taken at a meeting of representative electrical manufacturers, held on December 18, in New York, under the auspices of the Business Development Committee of NEMA. At this meeting a great many facts and figures were brought out to show the extent of the market to Rewire America, as well as the existing necessity for rewiring. As a result of this meeting, a planning committee is to be appointed for the purpose of making more detailed investigation of the market and means of reaching it. The findings of this committee will be reported to a later meeting for consideration and action.

REA to Finance Group Wiring of Farm Buildings

Wiring of houses and other farm buildings for electricity will be financed by the Rural Electrification Administration in areas where rural line construction is making electricity available, according to an announcement by REA Administrator Morris L. Cooke. Financing of appliances, as heretofore, will continue under the direction of Electric Home and Farm Authority, which will operate in both rural and urban areas. Financial aid for wiring installations will be available both along lines financed by REA and those built by private capital.

This new wiring policy was discussed at conferences on December 10, between Administrator Cooke and Dan W. Tracy, president of the International Brotherhood of Electrical Workers, and Earl N. Peak, president of the National Electrical Contractors Association. Cooperation in working out the most economical procedures was assured.

In order to reduce overhead charges, REA will receive loan applications only through local sponsors who will group individual requests in order to secure the economies of large volume. Administrator Cooke points out that "the cost of wiring can be reduced substantially by cooperative action resulting in a contractor wiring a hundred

or more farmsteads under a single contract rather than bidding on each individual farm."

League Starts Campaign to Sell Certified Contractors

The first step in the effort of the Electrical Association of Philadelphia to merchandise the electrical contractor to the public is a booklet and letter mailed to four thousand industrial and commercial power users. Further distribution will be made by manufacturers', wholesalers' and power salesmen. The booklet announces "Certified Installations, Repairs and Modernization" by "Certified Contractors." The contractors in the group have subscribed to a four-point code of quality workmanship and materials.

This booklet discloses the direct

savings in engaging the services of a certified contractor, tells what he is equipped to do and explains why he is able to offer a superior yet economical service. A number of pictures of typical work handled by this group completes the booklet.

New Conduit Standard Gives Acceptable Tapers

Information on acceptable tapers is included in the revised rigid conduit standards recently issued by Underwriters' Laboratories. Besides the requirement of four dips in a standard copper sulphate solution as a test for all types of zinc coatings, the standard includes data on effective length of threads, pitch diameter at end of conduit, as well as a table of wall thickness and inside and outside diameters.

N.E.M.A. Sues N.Y. Union, Claiming Trade Restraint

Charging that a wall has been thrown around the New York Metropolitan market, N.E.M.A. and fourteen of its members have filed suit in the United States District Court against Local No. 3, I.B.E.W., under the Sherman Anti-Trust Law, asking heavy damages.

The New York union is accused of conspiracy in restraint of trade and of injuring the plaintiffs' businesses in various ways, including coercion of New York City property owners, builders, architects and contractors, through fear of strikes and boycotts, to refrain from buying electrical equipment manufactured by any of the plaintiffs. The court is asked to grant temporary and permanent injunctions against the union and its officers. One of the alleged purposes of the conspiracy charged against Local No. 3 is to compel all wiring or assembling of electrical equipment installed within the Metropolitan area to be done by union men.

The complaint charges that No. 3 has refused to permit its members to install electrical equipment manufactured by the plaintiff companies, and that installation by others would result in strikes among about thirty other building trades.

Although the union agreement is with the electrical contractors, the latter have not been made a party to the suit.

The case will be watched with considerable interest by union employers in the large centers, because of its possible effects upon working agreements.

The companies named as co-plaintiffs with the Association are: Allen-Bradley Company, Allis-Chalmers Manufacturing Company, Clark Controller Company, Colt's Patent Fire



SAGE OF HUDSON VALLEY: As a pioneer contractor of the Hudson Valley region, Roswell Coles of Kingston, N. Y., has seen many of his former employees graduate to their own establishments in nearby communities. Besides continuing his own contracting business, Mr. Coles gives liberally of his time and industry experience in serving as president of the Hudson Valley Electric League, which comprises local chapters at Kingston, Newburgh, Catskill and Poughkeepsie.

MEET THREE

"TOUGH GUYS"



HERE'S WHY:

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Short, thick shafts

Measured lubrication

Heavily insulated vibration-proof stators

One-piece rotor windings

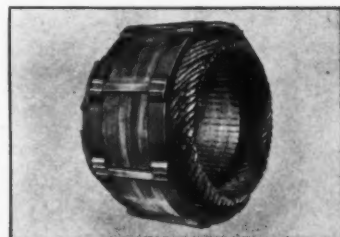
All internal connections welded

Permanently plastic moisture-, oil- and acid-resisting insulation on all stator windings

LOCKED AND WELDED STATOR CORE—with laminations perfectly japanned and locked and welded under compression between sturdy stator heads. The only bolts and nuts used in the motor are those necessary to hold the bearings to the frame.

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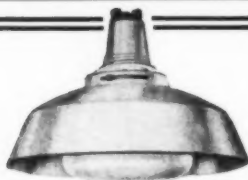
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MULTI ELECTRICAL MFG. CO.
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Arms Manufacturing Company, Cutler-Hammer, Inc., The Electric Controller & Manufacturing Company, General Electric Company, Hardwick Hindle, Inc., Monitor Controller Company, Palmer Electric & Manufacturing Company, and Westinghouse Electric & Manufacturing Company.

New Seattle Chapter Officers

H. M. Sayers, who last year was vice-president of the Seattle Chapter, N.E.C.A., was elected president of that organization at its recent annual meeting, succeeding J. J. Agutter. Other officers elected were L. J. Benedetti, vice-president, and O. A. Carlson, secretary-treasurer.

Washington Contractors Carry on

Despite the general letup incidental to suspended NRA operation, the Electrical Contractors Association of the District of Columbia, Inc., has continued to function with general membership interest. According to George A. Ford, president of this organization, there are forty-three members in good standing, all representing open shop employers of the District. The principal benefits derived from membership in this organization are through cooperation with the local electric league and power company. Cooperative merchandising and wiring promotion activities are supported by the association. The results of this work are said to

have been justified. Various active committees carry on in general industry relations, and in collaboration with the union shop group where matters of mutual interest are involved. The association is now over two years old.

James H. McGraw Retires

At a meeting of the board of directors of the McGraw-Hill Publishing Company, Inc., held on December 27, 1935, James H. McGraw, the founder of the company and its head for more than fifty years, resigned as chairman of the board and was elected honorary chairman. He will remain as a member of the board.

James H. McGraw, Jr., who has been connected with the company for the past twenty years, was elected chairman of the board. He has served as treasurer and was executive vice president and vice chairman of the board at the time of his election.

Malcolm Muir, president of the company since 1928, continues in that capacity.

To Start Construction Census in January

A Nation-wide Census of construction is to be made by the Census starting in January and covering 1935 operations. Figures will be secured for the number of persons employed by contractors, man-hours of work in 1935, disbursements for salaries and wages, value of contracts and orders received during 1935, value of construction work performed, and expenditures for materials.

The schedule form is arranged to show five separate types of construction, further classed as new construction or remodeling, repairs and maintenance. Private construction and public construction are also to be reported separately.

Only sworn employees of the Bureau of the Census are permitted to examine the individual reports and then only for the purpose of compiling statistics. No access to information furnished is permitted under the law, not even to other Governmental agencies, and no information will be disclosed which would reveal any of the facts or figures in the individual reports.

Every effort will be made to complete the field canvass in three months. This will make it possible to issue the first results by July.



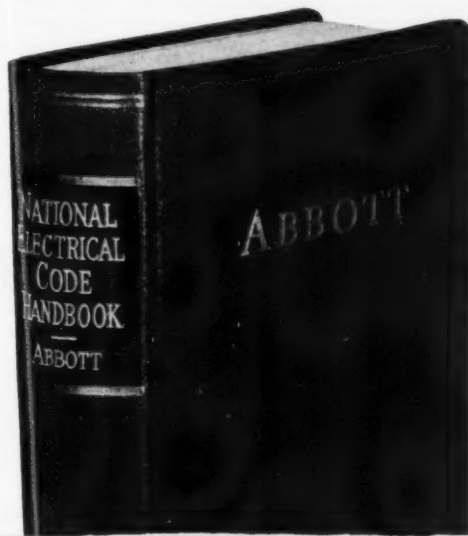
YOUTHFUL SPECIALIST: An important department at the National Electric Co., Inc., of Passaic, N. J., is the industrial sales and service business which is handled by Clifford L. Justesen, youthful vice-president of that company. His specialty is knowing what the industrial customer is apt to need in emergencies, and how to supply it correctly and quickly in conjunction with the outside construction department or the motor service shop.

Robert Edwards

Robert Edwards, president of Edwards & Company, Inc., died on December 27, at the age of 63. Mr. Edwards succeeded his father, the founder of the business, as president and treasurer of Edwards & Company

Just Out!—New 1936 Third Edition

**Simplifies
and explains
the
NATIONAL
ELECTRICAL
CODE**



**—covering latest
Code rules**

Here is a complete revision of Abbott's useful Handbook, covering all changes, new rules, etc., in the latest National Electrical Code. Use this book to get work done according to the Code. Gives rules and requirements for all jobs—what they mean—how to apply them. This unusual book, planned for quick reference use by busy, practical men can also be used by anyone who wishes to make a thorough study of the National Electrical Code.

Abbott's NATIONAL ELECTRICAL CODE HANDBOOK

by ARTHUR L. ABBOTT

Third edition, convenient size, fully illustrated, \$3.00

How this book helps you:

Valuable data for the electrician, inspector, contractor and architect

- definitions of the terms used in the Code
- types of wiring approved under given conditions
- requirements pertaining to standard materials and apparatus and to the standard methods of installing such materials and apparatus
- general requirements applying to all wiring systems
- automatic overload protection covered both in section on general requirements and in connection with specific applications
- simplified application of Code data pertaining to motor installations
- special requirements pertaining to emergency lighting, high-voltage equipment, services, grounding, design of installations, etc., etc.

- Enables the user to grasp readily the plan, scope and purpose of the National Electrical Code requirements
- Groups Code rules in practical, handy way, according to jobs to which they apply
- Clarifies rules with simple discussions, diagrams, and illustrations
- Certifies your methods; keeps you up-to-date; helps your work pass official inspections

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STRONG—tougher than steel, re-usable, withstands abuse
CORROSION FREE—resists salt air, fumes, will not season crack
COMPACT—easily taped, neat

BURNDY
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305 EAST 45TH STREET, NEW YORK
Agents Everywhere

in 1912, after twenty years in the electrical business spent very largely with electrical wholesalers. For nine years he was city sales manager in New York for Western Electric, and for two years was in Canada where he organized the supply department of the Northern Electric Company. Of late years Mr. Edwards was very active in NEMA, being interested in building up better industry relations. During the days of NRA codes he was the supervisory agency for the Installation Devices Section.

A Roll o' Tape

**Electrical Flashes
gathered among the
big wire and pipe men**

by
**Electrical Contracting's
Field Editors**

A \$700 smoke detector job was recently installed by the Davis Electric Company of Newark, N. J., which saved the owners \$400 in fuel costs in the first year.

TRANSFORMER rooms in large school jobs frequently involve only an installation job for the electrical contractor, but when O. B. Linquest of Jamestown, N. Y., signed up the new local high school, he followed through by securing the additional order for three 75's and a 100, which were required in the sub-station.

IT may be an old saw to some folks, but Dewey H. Cowan of Ben Cowan & Bros., Hoboken, N. J., takes the subject of quality wiring devices seriously. A commercial job that he lost less than a year ago to "gyp" competition has already burned out a dozen or more switches. Needless to say, Dewey Cowan got the job of putting in high grade switches which can "take it," and the owner now realizes that the best is none too good in severe-use wiring devices.

EMIL A. KERN of South Orange, N. J., who specializes in electrical maintenance and service contracts in theatres, industrial and commercial establishments, shuns the term "contractor." He likens it to a sort of wager, whereby it is agreed to undertake something at a price at which the owner is willing to bet it can't be done.

BELIEVING that intelligent industrial executives are interested in "horrible examples," when they are indicative of important plant losses or shutdowns, the Ferguson Electric Construction Co., Buffalo, N. Y., has a selected set of specimens. These include faulty splices and wiped sleeves on high voltage cable, sections of arced feeder conduits, etc.

A \$46,000 switchboard change-over job is keeping the K-W Electric Company of Newark, N. J., busy these days. More than \$30,000 is being paid for the board, which is to control a county asylum power plant.

STARTING a new business in April, 1935, at Jersey City, N. J., Donaldson Brothers have found residence wiring jobs aplenty. The best jobs are those done for home-owners who "believe it or not" were still living in unwired homes.

WHEN the Naumer Electric Co. wired a newspaper plant in Brooklyn, this New York firm installed contactor cabinets of uniform size to permit an interchange of operating mechanisms from time to time without having to remove the cabinets. This allows changes being made in motors and controllers without expensive changes of conduit runs to fit different cabinets.

A NEAT glass wall case containing old-time relics, is on display in the office of George H. Schardien, chief electrical inspector of Elizabeth, N. J.

AMONG the pioneers of electrical contracting we find Louis Fort of Jersey City, N. J., who operated in the early days of industrial wiring when special conditions had to be overcome with hand-made fittings and accessories. Mr. Fort is a stickler for uniformity and orderliness in wiring. He terms sloppy or ill-chosen equipment as "hickety-pickety" methods.

EDWARD A. GARDNER, proprietor of the Gardner Electric Service, West New York, N. J., devotes a lot of personal effort to cooperative activities, hoping thereby to bring more contractors together for better electrical conditions. As president of the Hudson County (N. J.) Electric League, he thinks nothing of riding to other cities after a hard day's work, for the purpose of discussing better contractor conditions.

Electrical Contracting, January 1936

WHEN J. W. Broadfoot Co., Inc., of Paterson, N. J., completed more than \$100,000 of transformer station work in a large local aeronautical works, they obtained some choice photographs of their work for office decorative purposes.

COMPLETE electrical jobs must be ways desirable, in the opinion of Farrel & Jarvis Corp. started the first electrical contracting business at New Rochelle, N. Y. Charles V. Jarvis cites an apartment wiring contract secured in 1903 that consisted of an elaborate door bell and speaking tube system, but which included no wiring for lights. Electric light wiring to replace gas lighting fixtures was installed in this building by his company only two years ago.

CHANGING store locations isn't always desirable, in the opinion of Abe Tudoroff of Tudoroff Bros., Kingston, N. Y. After fifteen years in "downtown" Kingston, and a move "uptown," these contractor-dealers decided to come back to their original neighborhood again.

WHEN the Carrol-Ratner Corp. moved to new quarters in a choice shopping section of New Rochelle, N. Y., its attractive store front was boldly yet neatly lettered "Westchester Lighting Studios," while the company name was placed elsewhere in smaller lettering. This contractor-dealer firm maintains an exceptionally fine stock of residential lighting equipment, some of which is tastefully arranged in large two-story display windows.

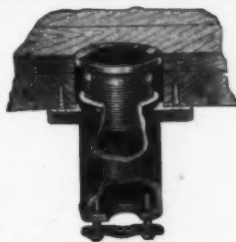
ALTHOUGH considerably handicapped by its requirements, James Wollenberg of Paterson, N. J., has much praise for Canadian regulations governing electrical contractors. The Wollenberg Electric Co. recently traveled to Huntingdon, Quebec, when a silk mill was moved there from Paterson. When Mr. Wollenberg had completed his job drawings and had obtained approval from the inspection authorities for every detail that was involved, he realized that Canada takes the art of wiring seriously.

POLARIZATION is not taken lightly by Frederick A. Martin of Rochester, N. Y., who recently had a call to protect a customer from severe shocks received while she used her washing machine. After clearing a ground at the machine, Mr. Martin installed a stranded No. 14 ground wire by taping it to the motor cord, this being provided with a large battery test clip for gripping the conduit above the exposed wall outlet. Not exactly N.E.C. standard, says Mr. Martin, but above the minimum requirements, and also within the lady's purchasing power.

Electrical Contracting, January 1936

FLOOR BOXES &

WIRING SPECIALTIES



NO. 300 "LATROBE"
MIDGET FLOOR RECEPTACLE
AND BOX

The only non-watertight floor receptacle and box on the market approved by the Underwriters' Laboratories for installation in wood floors.



NO. 252-R TWO GANG BOX

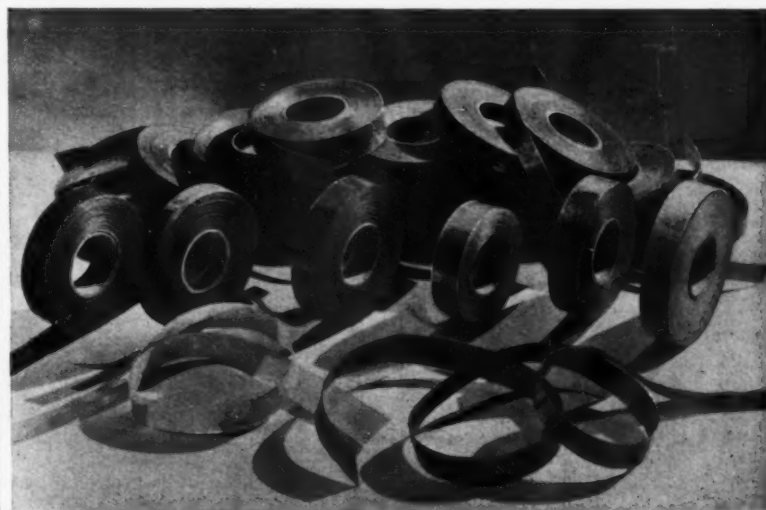
Two gang Adjustable Floor Box with No. 208 Receptacle in one section. One cover plate with 1/2" Flush Brass Plug and the other cover plate with 2" Flush Brass Plug.

NO GRIEF WITH FULLMAN!

Fullman's floor boxes and wiring specialties can be installed in a few minutes—no fussing with small screws or complicated parts. And once they're in, your troubles are over. Skillful design, sturdy construction and economy of cost and installation make Fullman an outstanding buy. Write for catalog.

"Latrobe"
FLOOR BOXES

FULLMAN MFG. CO.
LATROBE - - - - PENN.



MICABOND tapes

INDISPENSABLE FOR EMERGENCY OR PERMANENT
REPAIRS

Micabond Tapes are pliable without being tacky. They do not readily dry out under ordinary conditions. They are made in a variety of types. Let us send you samples—a post card will bring them. We shall also be glad to send you the complete MICABOND catalog.

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK, DELAWARE

The
Badger
50 Amp.
**SYNCHRONOUS
TIME SWITCH**



A thoroughly reliable, high quality time switch that will give many years of dependable service.

The result of over 26 years of exclusive time switch manufacture, this product offers the latest in design and construction.

Approved by the Underwriters' Laboratories and fully guaranteed by the manufacturer.

See your wholesaler or write for complete descriptive literature.

**RELANCE AUTOMATIC
LIGHTING CO.**

1937 Mead St.

Racine, Wis.

Your copy of the

**BUYERS
REFERENCE
NUMBER
of
ELECTRICAL
CONTRACTING**

*is your buying
guide for 1936*

**IT WILL SAVE YOU
TIME AND MONEY!**

TWO important sources of trouble which foremen must check carefully, according to H. A. Worden of Hewitt and Worden, Newburgh, N. Y., are the depth of furring for, and the height of tile or marble wainscoting.

AMONG the pioneer contractors of Baltimore, Md., is L. A. Herstein, who began his business in 1902, and is still doing a commercial and industrial business that is about 95 per cent open orders. His son, N. S. Herstein, surmises that a record of not more than four or five service complaints per year has considerable to do with having many steady accounts which date back twenty-five years or more.

WHEN E. H. Bishop added a modern welding shop to the facilities of the Electric Service Repair Co., at Paterson, N. J., he selected one of his most capable shop-men and sent him away for a special course of training on how to weld rotors, build up worn motor shafts, patch end-frames, and other jobs of the sort.

IT IS remarkable how human intelligence and will power can overcome one of man's greatest handicaps—loss of sight. Although W. N. Barlow of Barlow-Reilly, Inc., Yonkers, N. Y., has been totally blind for fifteen years, he is keenly conversant with industry trends and conditions, was a member of the NRA administrative board for Westchester County, and has been a leading contractor of that section during these years.

WHEN the Eifler Electric Co., Inc., modernized its quarters a few years ago at Union City, N. J., a truly modern effect was carried out. This was topped off by placing a motor-mounting turret on the roof to symbolize its motor service facilities. A large model motor is visible from any direction that one approaches the intersection where this attractive building is located.

SPLIT wage scales help contractors obtain industrial work, says L. A. Costello, Costello Electric Co., Paterson, N. J. The local union has made a lower wage scale applicable to such work since September 1, which reduces the rate from \$12.00 to \$9.00 per day.

GROUND connections are adequately provided for in a new ink manufacturing plant at Lodi, N. J., that is being wired by the National Electric Co., Inc., of Passaic. A 2/0 stranded bare grounding bus extends in the concrete floor throughout the length of this plant, which has lateral tap-offs that connect to the frames of explosion-proof motors. Each end of this cable is connected to outdoor grounding electrodes which are grouped 10 ft. apart, twenty-one in all.

IN DOING work for chemical plants and dye works, the use of pole line construction methods indoors solved many acid corrosion troubles, says H. W. DeSaix of the Watson-Flagg Engineering Co., Paterson, N. J.

WHEN the Edward Joy Company tackled the big wiring contract for New York Central's new Syracuse (N. Y.) depot it was right down the groove for Walter T. Haswell, that company's electrical engineer. Mr. Haswell served twelve years in that railroad's engineering service before joining the Joy staff.

SOMETIMES it pays big dividends to look for trouble, judging by the results obtained by Herbert G. Martin, Inc., of Yonkers, N. Y. An industrial plant wiring job grew from a medium sized job to more than \$30,000 because Mr. Martin was able to show the owners that their faulty wiring system and obsolete motor protective devices accounted for a \$10,000 per year maintenance bill.

WHEN the present motor service shop was laid out by Berger Brothers Electric Motors, Inc., of Rochester, N. Y., it was planned to provide a peak production capacity of \$1,000,000 per year. Although this volume was never reached, a peak force of seventy-five employees has been employed without confusion.

Industry Good Will

(Continued from page 8)

highways from coast to coast and Canada to the Gulf?

With universal electric service on all main highways, why not give consideration to the electrifying of the automobile industry? Possibly a little premature but not at all impossible. If the consideration had been given electric automobiles as has been given the gas engine development, we might be surprised at the results. There are many other developments we as an industry should be working with and that should be given earnest consideration.

Men of the electrical industry, do you feel it is time for us to get together on a real constructive program, having confidence in each other and working to the development of the electrical industry, to the mutual benefit of the electrical manufacturers, wholesalers, utilities and contractor-dealers as well as to the general benefit of all mankind? Friends, I leave the answer to you.

Electrical Contracting, January 1936

New Products . for January . .

Commercial Lighting Unit

Westinghouse Silvrn luminaires are designed for stores, offices, restaurants and all general commercial applications. Three hundred or 500-watt inside frosted lamps are recommended.



The basin is Alzak satin finished with a highly polished band, drawn to a diameter of 18 in. from No. 16 ga. special etching grade aluminum sheet. An Alzaked matt finish reflecting surface on the inside provides a wide coverage of light on the ceiling. A Trans-Lux reflecting disc on the inside, of heavy pressed Monax glass has concentric prisms on the outside to provide greater reflectivity and lower surface brightness. The Monax outer glass globe is smooth on both sides. The canopy, 4-in. diameter stem, and husk are also made of aluminum. The approximate overall length of this luminaire is 39 in., but the stem is designed for being easily shortened. An easy-to-wire socket, which has all metal parts nickel plated, and other facilities for ease of assembly are claimed. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Branch Circuit Panel

Dead front plug fuse cutout assemblies ranging from 4 to 24 circuits which are



arranged for mounting toggle switches beside each fuse terminal. Fuses and switch levers are covered with a main door. Connecting straps are provided

for making up toggle switch controls as desired. The dead front interior assembly is said to be independent of the cabinet trim thus eliminating the necessity of adjustments with flush type units to meet variations in plaster thickness. Surface types are also available. Wadsworth Electric Mfg. Co., Inc., Covington, Ky.

Outdoor-Use Wire Connector

The use of high copper bronze in making solderless connectors for all wires, No. 12 or smaller, is claimed to insure against weather cracking during their exposure to the most extreme atmospheric conditions. Sherman No. 501 bronze connectors include the same features of design as were developed earlier for the No. 500 all-brass solderless connectors. The bronze line is recommended for neon signs and other outdoor uses. H. B. Sherman Manufacturing Co., Battle Creek, Mich.

Five-Position Reflector

Directional reflectors for lumiline lamp holder bases which may be installed in any one of five positions for



reflecting light in a similar choice of directions. They may be placed end to end to form a smooth uninterrupted reflecting surface. The No. 1191 reflector is 12 in. long, and the No. 1192 is 18 in. long. Each unit has five twist-outs on each end for mounting the reflector between pairs of No. 1127-A lumiline lamp holders. Corresponding knockouts are provided in the mid-length of the reflector for fastening it with a screw to a No. 1100-C cover that fits No. 1100-B channel. The Wiremold Company, Hartford, Conn.

Narrow Sign Transformer

Narrower frames for neon signs are said to be possible because of a thin type transformer that has been developed for

sign service. Although its width has been reduced to a minimum, both the core and coil construction are claimed to be so



balanced as to provide for the greatest efficiency and maximum performance comparable with types of far more liberal dimensions. The Acme Electric & Manufacturing Co., Cleveland, O.

Non-Metallic Switch Enclosures

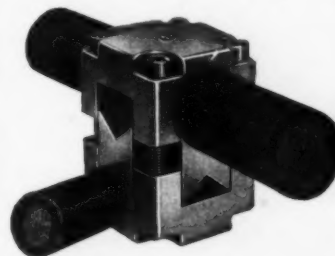
A line of enclosures for industrial control stations made of molded phenolic compound. These are made watertight and include molded compound switch levers for protecting the operator from electrical contact with live



metallic parts when these stations are located in damp locations, as in marine type work. Complete enclosures can be had which include up to four control units mounted in one enclosure. These are designated as CR 2940 master switches and may include normally open and normally closed circuits of the momentary-contact or the latched-in type. General Electric Co., Schenectady, N. Y.

Cable Connector

The "P-X-T" line of solderless cable connectors was developed for making parallel, cross or tee connections ranging from No. 4 to 1,000,000 cm. cables. Each fitting consists of three pieces, a

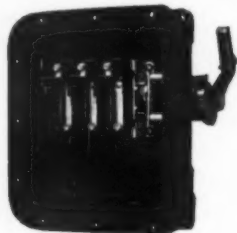


top and bottom section of identical design, and a center piece. Four socket-head cap screws are used to clamp these sections and the cable connections together. Three sizes are

available which take wire sizes from No. 4 to No. 1/0; from No. 1/0 to 500,000 c.m.; and from 500,000 c.m. to 1,000,000 c.m. Socket-head wrenches are supplied with each connector. The Trumbull Electric Mfg. Co., Plainville, Conn.

Explosion-Proof Switches

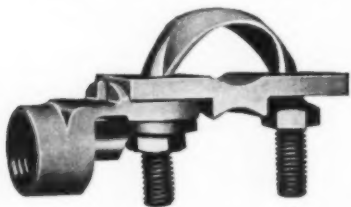
Heavy duty non-fusible industrial type switches with weatherproof semi-steel cast enclosures, for use in Class I, Group D hazardous locations, and all lower classifications. Heavy corrosion-proof



bolts are provided for the covers except for the 200-amp. sizes, which have regular hinges. Single throw switches are quick-break and quick-make, while the double throw are quick-break and positive-make, neither type having the interlocking cover feature. These switches can be had in two and three poles, from 30 to 200 amps., 575 V., a.c., and 600 V., d.c. Square D Co., Detroit, Mich.

Grounding Fittings

Fittings for making grounding connections employing a reversible shackle which fits three sizes of water pipe. The ground conductor may be soldered, or the soldering lug can be screwed tight as a bonding washer for solderless connections, by hooking the wire into a groove that is provided for this purpose. A U-bolt and wide flat



strap provide the water pipe connection. This is claimed to afford high bonding pressure without injury to the pipe and allow the conduit hub to meet the pipe at any angle. Type SP-825 is intended for 1-in. conduit, and Type SP-826 (illustrated) is for 1 1/2-in. conduit. A similar fitting, Type SP-828, is available for armored cable. General Electric Co., Schenectady, N. Y.

Low-Ceiling Reflector

A line of prismatic glass reflectors for use with high intensity mercury vapor lamps at low bay mounting height. "Lobay" reflectors are said to provide even light distribution without glare, at high output and utilization efficiency. A

cast fin-type hood, with 1/2-in. pipe thread, encloses an easily wired porcelain socket, and also supports the arms that hold the removable reflector ring. Removable



covers made of either steel or aluminum are designed to fit over the outside surface of the glass reflector. Holophane Company, Inc., New York, N. Y.

Voice Amplifier System

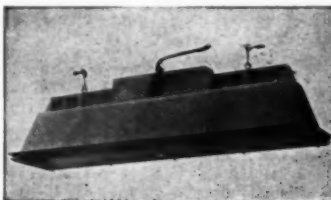
One or more microphones may be used in connection with a speaker-amplifier in



the "Orderite" system, for giving one way messages or orders in cafeterias, warehouses, offices, etc. A lamp signal is provided in the hand type, and counter or wall type microphones which indicates when the system is being used by another microphone station. A flexible cord and push button connection at the speaker-amplifier may be used for signal-back flashes to the microphone lamp signals. This system is said to reproduce normally spoken microphone orders in loud and clear messages that may be heard 25 to 100 ft. from the speaker. Available for 110 V. a.c. or d.c., or universal service. S. H. Couch Company, Inc., North Quincy, Mass.

Trough "Daylight" Unit

A trough-type luminaire for producing "daylight" effects in displaying objects and materials in their true color. It is equipped with two 400-watt high-



intensity mercury lamps and transformers, and three 500-watt inside frosted mazda lamps spaced alternately with the mercury lamps. The lamps are mounted vertically, with the transformers placed in the ventilated upper section of the unit. Flashed opal glass is used to diffuse the light. A white baked enamel interior reflecting surface is augmented by mounting an etched aluminum reflector in the top of the trough. Two louvers are provided at the lower edge of the trough to re-direct a portion of the light toward the ceiling. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Post Top Reflectors



A line of Quad reflectors for 200, 300/500 and 750/1,500-watt lamps complete with pole top mounting accessories. These reflectors are designed for general outdoor illumination such as city parks and playgrounds, gasoline service stations and other outdoor locations. Porcelain enameled reflectors may be had in standard green outside finish, white inside; also red, blue and other special colors. A cast aluminum socket housing designed to fit over 2-in. pipe, has cadmium plated iron rods which support the reflector that is decorated with an ornamental knob at the top. Quadrangle Mfg. Co., Chicago, Ill.

Light Meter

A compact light-measuring device which has its light-sensitive cell or



window at the top end, thus permitting the scale being read on its face at close range without creating body shadow interference. This "Light Meter" is 2 1/2 in. square and 1 1/2 in. thick, and has a rectangular-shaped ammeter scale with a range that is calibrated to read from 0 to 75 f.c. The instrument is said to be balanced for obtaining readings with the scale held in a perpendicular, face up or face down position. Incandescent Lamp Dept., General Electric Co., Cleveland, O.

Trade

Literature . . .

Standards on Electrical Insulating Materials: A 312-page compilation "A.S.T.M. Standards on Electrical Insulating Materials," annual issue. Price, \$1.75 per copy. American Society for Testing Materials, Philadelphia, Pa.

Voice Amplifier System: Bulletin No. PAM-5 describes "Orderite" systems for reproducing one way messages from one or more microphones to a central amplifier-speaker station. S. H. Couch Company, Inc., North Quincy, Mass.

Insulators: Pin type and strain insulators, also accessory hardware for 2,300 to 66,000-volt lines. Detail dimensions and performance characteristics are given for all listings. Catalogue CPG-10, 28 pages. Porcelain Products, Inc., Findlay, O.

Mercury Vapor Lighting: Bulletin No. 550 presents a series of photographs showing the results obtained with mercury vapor lighting in high bays and low bays. Physical and electrical characteristics of the lamp, ballast equipment, and reflector designs are also discussed. General Electric Vapor Lamp Co., Hoboken, N. J.

Brush Specifications: A 38-page catalog No. 19-C "Complete Brush Service" containing data on carbon brushes for domestic and commercial appliance motors, chiefly of the fraction horsepower a.c. and d.c. types. The Ohio Carbon Co., Cleveland, O.

Conduit Fittings: The most complete conduit catalog ever published is available to everyone interested in conduit fittings. It is prepared in loose-leaf form and employs a new tabulating system for quick reference. Crouse-Hinds Co., Syracuse, N. Y.

Low Bay Lighting: A 6-page folder describing "Lobay" reflectors for use with high intensity mercury vapor lamps at low bay mounting heights. Holophane Company, Inc., New York, N. Y.

Illumination Text Book: "Artificial Lighting and Its Applications" covers, in thirteen chapters, every phase of the lighting art, from fundamental theory to all classes of present-day practice. Several sections are included to cover sodium and mercury vapor illuminants, while a chapter is devoted to the theory of seeing which places new emphasis upon the human eye. Available in green paper binding, 258 pages, price

50 cents. Commercial Engineering Department, Westinghouse Lamp Co., Bloomfield, N. J.

Trade Notes . .

Link-Belt Co. has moved its executive offices from 910 S. Michigan Avenue to the Bell Bldg., 307 N. Michigan Ave., Chicago, Ill.

J. H. Crawford has been appointed manager of the construction material sales division of the General Electric Company's Merchandise Department, Bridgeport, Conn. Mr. Crawford, who was first employed by the company in 1905, succeeds the late Frank W. Hall.

J. D. Daly, formerly with the Miller Co. in Meriden, Conn., has been appointed sales manager of the Hartford, Conn., office of the Graybar Electric Co.

The Thomas & Betts Co., Elizabeth, N. J., announces the appointment of Turrell & Benfield, Inc., located in the Architects Bldg., Detroit, Mich., as its Michigan sales representative.

The Emerson Electric Mfg. Co. announces the opening of a branch sales office in Detroit, Mich., in the Stormfeltz-Loveley Bldg., Woodward and Grand Blvd.

E. A. Hancock has been appointed district manager of the industrial department of the New England district of the General Electric Co., succeeding C. A. Chase, who retired October 31.

The American Reflector and Lighting Co., Chicago, Ill., has engaged M. H. Van Allen as sales manager. Mr. Van Allen has been affiliated with the lighting industry for the past sixteen years.

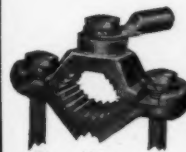
The National Fan & Blower Corp., Chicago, Ill., announces the appointment of K. E. Whitman as vice-president and general sales manager. Mr. Whitman has been identified in the fan, blower and unit heater industry for the past fourteen years.

Kuhlman Electric Co., Bay City, Mich., has appointed Richard P. Johnson assistant sales manager with offices at the factory. Mr. Johnson was formerly in charge of the Detroit, Mich., office. F. G. Guthrie and R. L. Gomon have been appointed as Detroit representatives, with offices at 235 Curtis Bldg.

Classified Advertising

Position Wanted: Fifteen years' experience estimating and supervising construction and maintenance. University graduate, degree E.E. Excellent references from present employer. Address Box 121, Electrical Contracting, 330 West 42nd Street, New York, N. Y.

SHERMAN RIGID GROUND FITTINGS



Easy to
Install

GF3

Made for perfect conductivity—ease of installation and flexibility of application — for soldered or solderless installations — can be used with bare wire, flexible wire or rigid conduit. Makes a more satisfactory ground in less time. Used by contractors everywhere.

GF3 (Illustrated) Solder or Solderless Fitting. Designed especially for No. 4 bare wire, but will take in No. 10 B&S—Slots permit separation of sections without removal of screws. They also permit easy installation. Pipe clamps may be reversed for use with ground rod.

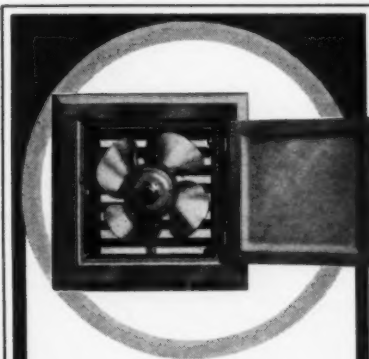
GF4 (not shown) for bare or insulated wire from No. 4 strands to No. 8. Has same slotted pipe clamp jaw as GF3. No. 4 wire need not be bent in assembly as snubbing action of indented groove assures tight contact.

Six other styles of Sherman Rigid Ground Fittings cover every requirement.

Send for Bulletin No. 12.

SOLD THRU JOBBERS

H. B. SHERMAN MFG. CO.
BATTLE CREEK MICH.



Full Automatic Wall Box Kitchen Ventilator Fan

Built-in type for permanent installation, it is telescopic in design, adjustable to wall thickness 7" to 13". No wood or metal frame or screws in the plaster, wood, or brick necessary. Inside and outside polished cast aluminum; wall box rust resisting steel. Quickly installed in old or new homes. Automatic switch and shutters controlled by opening and closing of the door. 10" silent blade fan; available for A.C. or D.C.; A.C. non-radio interfering. Write for bulletin and prices.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.

OFFICES IN PRINCIPAL CITIES

SIGNAL

BETTER SOLDERING LUGS



Wolverine Lugs are made from the best electrolytic copper of high conductivity and are processed under the complete control of Wolverine Engineers.

The Square End Design offers greater contact area and increases the current carrying capacity of the lug.

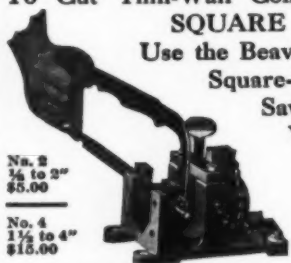
For greater safety use Wolverine Lugs.

**WOLVERINE
TUBE COMPANY**

1441 Central Ave., Detroit, Mich.
Stocks in All Principal Cities

To Cut Thin-Wall Conduit SQUARE

Use the Beaver
Square-End
Sawing
Vise



No. 2
3/4 to 2"
\$5.00

No. 4
1 1/2 to 4"
\$15.00

No. 2 is aluminum; No. 4 malleable iron. Both are self-contained—and simple to use with a standard hack saw. Renewable inserts. Through your jobber. Write us for complete catalog.

Beaver Pipe Tools, Inc., Warren, Ohio

LESS DRILLING and

More Powerful Anchorage are important factors on every job that requires the fastening of Electrical Equipment to concrete or masonry—You get these advantages with



CHICAGO

EXPANSION NUTS

(Machine Screw Anchors)
made in all sizes, long,
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Setting tools with every order.

SEND FOR FREE SAMPLES
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CHICAGO EXPANSION BOLT CO.
128 S. Clinton St. Chicago, U. S. A.



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Indoor and
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Service

Send for
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Warren Ohio

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ALL THREAD CONDUIT

Made from Enameled Conduit. Standard sizes in stock—special to order.



GALVANIZED CONDUIT REDUCER

A very useful fitting.
All sizes from 4x3 1/2 to
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Write for complete details and prices.

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Ask Headquarters

The **TORK CLOCK COMPANY, Inc.**
Mount Vernon, New York

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You can't afford
to miss a single
issue

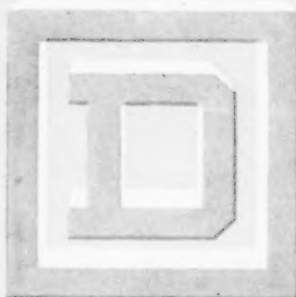
Give us your
new address if
you have
moved

for **HAZARDOUS** locations!

Explosion-proof Switches and Motor Control by **SQUARE D**



Explosion-proof safety switch — Catalog No. 54341. The enclosures are semi-steel castings with wide and carefully machined surfaces between box and cover. The cover is held in place by heavy corrosion-proof bolts. Pipe threaded conduit holes at top and bottom with extra pads on both sides for drilling other conduit entrances. Built for single or double throw, not fusible, two and three pole, from 30 to 200 amperes, 575 Volts A. C.; 600 Volts D. C.

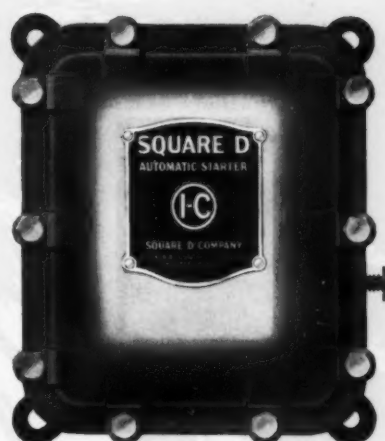


Explosion and fire hazards exist in practically every industrial plant. Often the owners and operators of these factories do not realize these hazards until it is too late. The electrical contractor can serve his clients by locating these danger spots and suggesting the remedy.

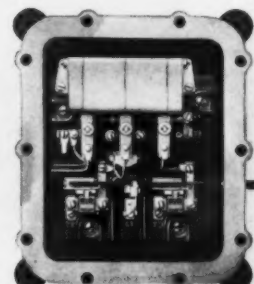
Square D builds both safety switches and automatic electric motor control to meet the requirements of the National Electric Code for Hazardous Locations — Class 1, Group D and all lower classifications.

Many factories are renovating their electrical equipment — replacing the worn and obsolete. Now is a good time to check up on possible fire and explosion hazards. It may mean a grateful client and a profitable job for the contractor.

If you want engineering assistance



Explosion-proof A. C. automatic starter — Class 8532 BR1. Push button remote control; thermal overload protection and low voltage protection. Cast iron enclosure with wide and carefully machined surfaces between box and cover. Maximum polyphase ratings 5 HP, 220 Volts; 7½ HP, 440-550 Volts. This automatic starter can be supplied with start and stop push buttons in cover or with separate explosion-proof push button station.



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SQUARE D COMPANY

DETROIT MICHIGAN USA MILWAUKEE WISCONSIN
SQUARE D COMPANY, INC., LOS ANGELES, CALIFORNIA
SQUARE D COMPANY CANADA LTD. TORONTO, ONTARIO



General Electric Wiring Materials Are Dependable • Durable



The market is ripe for wiring jobs — both re-wiring and new wiring. The public is interested now as never before —

(1) in better lighting and labor saving appliances for home use;

(2) in electrical equipment that will increase and improve production in factories at lower cost; and

(3) in new lighting and electrical equipment that will attract customers and tenants to commercial buildings.

The key to this business is in the contractors' hands. Prospects want to know how electricity can serve them better. They're interested in results.

To be sure that they get results, you should install quality materials when doing the jobs.

General Electric wiring materials — conduit, safecote building wire and wiring devices — are recognized for their quality. Moreover, the line is complete, comprising materials for any type of wiring job anywhere. Send for full information on General Electric wiring materials and on the G-E Radial Wiring System. This new system is designed to provide complete wiring adequacy for homes and apartments. Write Section CDW-681, Appliance and Merchandise Department, General Electric Co., Bridgeport, Connecticut.



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